The Ruger 1022 Exotic Weapons System

A Paladin Press Book

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Boulder, Colorado

The Ruger 1022 Exotic Weapons System
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Warning

It is against the law to manufacture a restricted or prohibited firearm without an appropriate license from the federal government. There are also state and local laws prohibiting the possession of such devices in many areas. Severe penalties are prescribed for violations of these laws. Be warned!

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Introduction

In the first volume of the *Exotic Weapons* series, we featured the selective-fire conversion of the AR-7 .22 L.R. caliber survival carbine. This compact, lightweight, reliable weapon was ideal for survival purposes and as a backpack rifle for outdoorsmen and women. The selective-fire capability further enhanced its effectiveness as an excellent close-quarter defense weapon. In this fourth *Exotic Weapons* volume, we are pleased to present a selective-fire conversion system for a .22 caliber rifle celebrated for its design excellence, reliability, and affordability—the Ruger 1022.

The Ruger 1022 semiautomatic rifle has long been one of the finest American-made and -designed rifles in its class. The number of useful accessories offered by independent manufacturers and the inexpensive price tag of the system make it "the" affordable, indispensable defense and survival weapon, unsurpassed, in our opinion, by any other rifle of its type.

With the variety of accessories now available by mail order—including folding stocks, muzzle brakes and compensators, 30- to 50-round drum and box type magazines, and more—this rifle can easily fill first place in the "affordable alternative" competition. Also, considering the price of ammunition, the .22 caliber submachine gun saves money. All things considered, the Ruger 1022 selective-fire rifle fills the need for a close-quarter, economical combat gun that is extremely easy to control.

Applications for a selective-fire .22 caliber submachine gun are many, particularly in the military and law enforcement fields. One such weapon marketed in the United States in 1972 by an Austrian company was the American 180-M2 submachine gun which received a great deal of publicity and praise during firing demonstrations for law enforcement agencies. Several correctional institutions in the U.S. reportedly purchased several hundred of these versatile submachine guns as riot control weapons. When the weapon is equipped with its revolutionary "Laser Lok" dot sighting system, the mere focusing of the dot on any man who values his life is more than enough to deter him—without firing the weapon. The rate of fire of the American 180 SMG was approximately 1,200 rounds per minute with standard velocity cartridges and is increased to about 1,600 rounds per minute when high velocity ammunition is used.

Other .22 L.R. caliber submachine gun designs include the Von Wimmesperg machine pistol which incorporates a dual barrel machined from a single square steel block. With twin twenty-round magazines, the weapon is reported to have a cyclic rate of about 3,000 rounds per minute with both barrels firing. A unique sound suppressor was also designed and developed for the Von Wimmesperg weapon.

Another interesting .22 caliber machine pistol was pioneered by Hans Seggern of New Jersey. His design incorporated a simplified trigger system for selective and non-selective automatic fire and made extensive use of lightweight

aluminum alloys.

But .22 caliber submachine guns are extremely rare and very difficult for a civilian to obtain. Even the American 180-M2 submachine guns were not offered to civilians and were almost impossible to get. One alternative for obtaining a submachine gun is to design your own or build one from an existing commercial rifle known for its reliability and effectiveness.

In choosing a weapon for conversion to a submachine gun, careful consideration must be given to magazine capacity for optimum firepower. A .22 caliber rifle on full auto can easily discharge more than 1,000 rounds per minute, and with a limited capacity magazine, you would need to be changing clips before you could count to three. You must therefore equip your conversion weapon with the maximum capacity magazine in order to make the most of its potential. Performance, firepower, and controllability are the main assets of the selective-fire Ruger 1022. With the many excellent accessories now being offered for the 1022 carbine, you can easily put together a gun whose configuration and size will suit your exact needs.

If you intend to convert this weapon to a submachine gun with a barrel shorter than sixteen inches, remember to duly register your converted weapon and converter unit with the BATF before making any move which you may regret later. Do what you must *legally*. This is the only way the law will protect you and your interests. *Be warned!*

1. The Ruger 1022 Selective-Fire Conversion System

At the beginning of this project, the designer began by experimenting with possible selective-fire conversion systems starting from the original factory trigger components. Although the open-bolt conversion system, which is very simply done and requires no modification to the receiver or trigger housing, has proven to be the ideal selective-fire conversion for the 1022, coming to that conclusion was not so easy.

The first several conversion attempts proved very unsatisfactory. These conversions incorporated a "drop in" type auto sear that is positioned in front of the hammer pivot portion. The original hammer has only a single notch for trigger sear provision, so a second notch was cut just above the first for the auto sear engagement. The automatic firing system is similar to that used on the Belgian FAL or the Russian AK-47 assault rifles. A long groove was milled underneath the bolt about 1/8-inch wide and 1/8-inch deep. About 3/16 of an inch was left ungrooved at the bolt's rear end to act as a tripping shoulder for the auto sear. This tripping shoulder hooks the auto sear tail end (top part), which protrudes about 3/32 of an inch above the trigger housing frame, just before the bolt fully closes.

The above conversion utilized the basic trigger mechanism except for the original push-button-type safety. This safety has been replaced by a three-position safety and fire selector lever. The original disconnector system was activated by the hammer cocking action. The hammer has a small lug which secures the hammer spring rod in place and pushes down on the disconnector hump during cocking action so that the sear can rebound and catch the hammer as the bolt moves forward after a full rearward recoil. The hammer back lug and the disconnector hump are slightly reduced as is the back of the trigger to increase the trigger pull. This additional pull accomplishes bypassing the hammer back to prevent the disconnection of the sear. Once the disconnector system is bypassed, the auto sear will catch the hammer in the fully cocked position as it is being depressed by the recoiling bolt. On forward recoil, the bolt will hook the auto sear tail end at ful closure and release the hammer automatically.

The provision for selective-fire functioning in the above conversion was totally controlled by the selector lever notches. The shallow notch grooved for semiauto functioning allows enough contact for the hammer back lug to reach and depress the disconnector hump. This action disconnects and releases the semiauto sear (the original sear) to its normal position in order to catch the hammer as soon as the auto sear releases it after bolt closure.

In the full auto mode, the deep notch of the selector provides longer trigger pull. When the trigger is pulled, the disconnector hump will automatically override the disconnection of the semiauto sear. The disconnector hump will not be pressed down by the hammer's cocking action since it now

rests a little forward due to the longer pull of the trigger and the hammer back lug that normally depresses the disconnector hump is no longer in line with it. Only the auto sear catches the hammer when the bolt recoils after a shot is fired. This results in automatic firing each time the bolt fully closes and the trigger pull is maintained.

The conversion described above could have been the simplest and most ideal conversion for the 1022 rifle. Amazingly enough, however, even though the theory is faultless and the action works perfectly when the system is operated by hand, when the weapon is fired, it will produce only semi-automatic functioning. When the selector is set at full auto, the weapon fires only the first chambered round leaving a very light firing pin impression on the second chambered round. The result is a single shot and an unfired shell in the chamber.

Several remedies were attempted to correct the problem but the weapon still would not operate properly in the automatic firing mode. Among the remedies incorporated to get the second round to fire were a stronger recoil spring, a longer firing pin, and a delayed hammer release. These additions made the weapon operate in a burst-fire mode firing three to five rounds before the action stopped due to an unfired shell in the chamber. Several top-of-the-line brands of high velocity ammunition were used in the test and still the results were the same. Various magazines and more honing on the operating components still did not make for reliable operation.

Perhaps the most important factor in the failure of the conversion described above utilizing the original factory trigger mechanism is the offset location of the recoil spring. The recoil spring was positioned to the left side of the bolt. Inside the receiver, there is enough gap to insert a dime. These two features tend to shift the bolt to the right, and on automatic firing, this shifting action combined with the slight bouncing of the bolt once it hits the chamber face will leave an open gap. Therefore, when the hammer is released and hits the firing pin, the impact is cushioned. When the rim of the cartridge is hit, the bolt is not fully closed against the chamber face. The hammer therefore delivers its full impact to the bolt instead of the firing pin which results in a misfire on the next round.

Perhaps the only remaining remedy would be to use a dual mounted recoil spring assembly to equalize the forward thrust of the bolt when it is closing. But since this would require extensive work on a milling machine and would therefore be costly to manufacture, the above-mentioned conversion procedure has been discarded in favor of the reliable open-bolt design. The open-bolt design system recommended here for converting the Ruger 1022 to a superb selective-fire weapon has been extensively tested and has proved to be reliable in normal shooting once the conversion parts are properly fitted.

To convert the original closed-bolt, hammer-fired design of the 1022 rifle to an open-bolt system, a new trigger mechanism must be incorporated. In considering the conversion, the main priority became simplicity of manufacture and no modification of the receiver or the trigger housing. Able to meet these requirements is our super-compact trigger mechanism, which is assembled as one unit and which can be installed or removed in a matter of seconds after the gun is stripped. The selective-fire converter is a "drop in" type neatly assembled in one compact subgroup consisting of the sear and trigger assembly. Only one spring powers the two parts. The sear has a built-in tripper that engages or disconnects from the trigger depending on the mode of fire selected. A small rectangular-shaped sheet metal housing contains the entire trigger group in a single compact unit. This unit is easily hand formed using improvised dies. This arrangement allows the converter unit to be inserted as a pack inside the original trigger housing plate once all the trigger components have been removed except the magazine catch assembly. The converter unit is inserted inside the frame and is secured in place by the original trigger and

ejector pin. After the unit is inserted in the trigger housing frame, the original ejector is then assembled in the usual manner while the ejector pin is being pushed in during final assembly.

Since the converter mechanism comes as one subgroup, no modification at all is required on either the trigger housing frame or the receiver. This leaves all the trigger mechanism usable should the operator want to switch back to the non-selective mode of fire. Simply substitute the appropriate components.

The one part that requires modification is the bolt. Since we have moved from a closed-bolt to an open-bolt design system, a new pivoting hammer bolt modification is necessary. Fixed firing pin systems are simply unreliable unless the firing pin is positioned on the feed rib itself so that it will not interfere with the loading process. The firing pin on the 1022 is top-mounted and is slightly offset to the right side.

Putting a fixed firing pin on the feeder will not permit the modified bolt to be used in the nonselective firing mode should the operator want to switch back from selective fire. Also the firing pin protrusion would be very small and wear faster than the original firing pin assembly utilizing the conventional pivoting hammer. A firing pin adapter has been incorporated so that the modified bolt can be used with the original factory trigger components for nonselective operation. The use of the firing pin adapter actually improves and strengthens the weak part of the firing pin: the rear end of the firing pin used on the gun is narrowly tapered and is subject to peening and bending after heavy use.

In the conversion process, this fragile tapered end of the firing pin is cut off and replaced by a 1/8-inch thick adapter that will outlast even the hammer itself with proper heat treatment. A long notch for the adapter assembly is cut at the rear end of the bolt. The easiest way to make this long notch without machining is to simply install three blades in your hacksaw. Grip the bolt in a padded vise with its rear end on top, being careful not to dent the bolt body. Then cut by following the straight line of the firing pin assembly groove on top of the bolt so you can make the cutting stroke straight. Cut the slot to the specified length, then smooth the rough hacksaw cut with the right size flat file until the 1/8-inch adapter can be inserted and moved freely inside the slot.

Another necessary bolt modification is the cutting of the step for sear engagement. This cut is made parallel to the bottom of the inclined surface on the bolt's underside. The inclined surface causes the bolt to undergo a slight retarding effect during rearward recoil after a shot is fired. This retardation gives time for the top cartridge in the magazine to position itself properly before being picked up by the bolt feed in the chambering process. The top center portion of the trigger housing frame has a mating step for this inclined surface on the bolt. The bolt is held on this step momentarily before being forced downward by the contour of the receiver's rear end until it is overcome by the recoil spring's resistance, thereby completing the cycle of operation. A step must be cut underneath the bolt so that the sear can engage it. The original, inclined surface will catch with the sear nose. However, it will not safely hold it in "open" position, and by simply pushing hard on the cocking handle, the bolt will be released and will fire the weapon accidentally. For this reason, a straight step is needed in order to lock the bolt positively with the sear in the open bolt position.

There are two ways of making this step. The method described in this book is preferred because the original trigger components can be used for nonselective firing. Note that the one photographed for the book has the underside of the bolt milled using a 1/8-inch diameter cutter. Note too that only the area which is in line with the sear nose was removed leaving the rest of the inclined surface untouched. The inclined surface of the bolt that is parallel to the mating step on top of the trigger housing frame (about 1/4-inch on both sides of bolt) must *not* be cut. If these areas were also cut, the bolt

would engage fully with the trigger housing top step, and would not move forward. It would be locked permanently in place and would cause unnecessary shaving on the inclined part of the trigger housing plate when the bolt was forced forward.

The second, unpreferred method of making the straight step underneath the bolt is to cut the step using a flat or square mill file if a lathe is not available. This will, however, affect the entire inclined surface of the bolt as it is not possible to cut the step this way without cutting horizontally through the whole inclined surface. This will make the bottom part of the straight step in the inclined surface about 1/8-inch deep as required for sear nose engagement. This bolt should not be used with the original trigger mechanism for nonselective firing. The bolt should be used only on the selective fire mode with the "drop in" trigger group in place. Since the converter housing is level with the upper middle step where the lower part of the bolt travels, the bolt will not be retarded during recoil. It will instead operate in a straight cycle. The inclined surface step for the retarding effect can be cut on the converter housing frame and shaped to the top of the trigger housing frame, but it is functional only with the milled bolt step described in procedure number one.

Another way of making the step if you do not have a lathe is by using a 1/4-inch diameter counterbore. A good vise and a drill press will be needed for this method. The counterbore will be positioned exactly at the point where the sear nose is in line when the bolt is assembled. A 1/8-inch deep counterbore will be needed for sear nose clearance. To do this so that the bolt still retains the original inclined surface (for retarding effect) and is still usable with the original factory components, the sear nose that engages with the counterbore of the bolt must be rounded up to blend with the counterbore radius. The contact surfaces of both the sear and the bolt must be highly polished after final fitting to ensure smooth operation. This will also produce less friction and wear on contact areas.

The open bolt design system incorporated in this project is well designed and carefully put together as a result of the extensive testing of various prototypes. However, the rifle cannot be field stripped without the use of a screwdriver, so even a "drop in" sear is going to require a few extra seconds to remove or install without opening the rifle. For this purpose, we have incorporated the "quick-change" selector system. Changing the selector is the fastest way of making your gun fire in either the selective mode or nonselective mode without stripping the gun.

Using the open bolt system, you can make a quick change-over from selective to nonselective fire by simply using two selectors. Use a lever-type selector with three indexes and double notches for selective fire. If you wish, the original push-button safety may be used for nonselective fire. The original push-button safety, however, will need to have a small plate about 1/16-inch thick soldered on top of the deep notch where the sear makes contact. The original depth of the push-button safety is a bit too deep for the sear and if used as is will produce automatic fire only. Once the metal plate is soldered into the push-button safety notch, you can gradually adjust the depth by cutting small bits from it until the sear nose is level with the converter housing top wall. This will allow it to clear the bolt when trigger is pulled. Make sure, however, that the disconnection of the sear trip and trigger is still positive when the trigger is pulled to prevent doubling or automatic fire.

In the field stripping procedure, the lever-type safety selector mechanism must be replaced by the push-button-type safety in order to lift the receiver body from the stock. Better still, make a plain slave pin about the same diameter and length as the original push-button-type safety. Both ends of the slave pin must be chamfered for easy insertion when replacing selectors. *Care must be taken during selector changes.* The selector index plunger is under spring tension. Support the other end of the pin that is being pushed out by the selector pin being inserted so that the ends of the two pins abut one another when passing the spring loaded plunger. Failure to do so may cause the plunger to disengage

SAFE
SEMI AUTO.
FULL AUTO.

SEMIAUTOMATIC OPERATION

With the weapon fully assembled and the bolt in the closed, forward position, insert a loaded magazine. Draw back the cocking handle until the sear catches the bolt and holds it in the open position. The weapon is now ready to fire. *Make sure that your selector is set on "semiauto" position before cocking the bolt. If the selector is on "safe" position, the bolt cannot be cocked as it is locked in its forward position by the sear nose* (E). If you are not ready to fire, always make it a habit to set the selector on "safe" position to avoid accidental discharge.

When you are ready to fire, move the selector lever to the middle position for "semiauto" mode of firing. These selector positions are only applicable to the method which incorporates the extra-strong index spring and 1/8-inch steel ball as described in the text. The arrangement which utilizes the original index plunger assembly works in reverse, with the "semiauto" setting in full forward position. (See the text explaining this.)

With the selector lever in the middle "semiauto" setting, the shallow notch (M) of the selector lever pin is now parallel with the lower part of the sear (L). Pressure on the trigger will cause the trigger hook (C) to depress the trip mating step (J), forcing the sear down and releasing the bolt. While on its forward recoil, the bolt will strip the top round in the magazine and load it into the chamber. While the bolt is closing, the lower part of the pivoting hammer (I) will then hit the ejector pin (G), causing its upper part (A) to strike the rear end of the firing pin (B). The impact of the pivoting hammer on the rear end of the firing pin (B) causes its front tip (H) to strike the rim of the cartridge which is now fully loaded in the chamber. This will fire the weapon.

If pressure is maintained on the trigger during this sequence of operations, the lower part of the sear (L) will now press against the shallow notch of the selector pin (M) and will cause a slight hesitation for the remaining trigger pull which is about 1/8-inch from the back of the trigger to the trigger guard end arch.

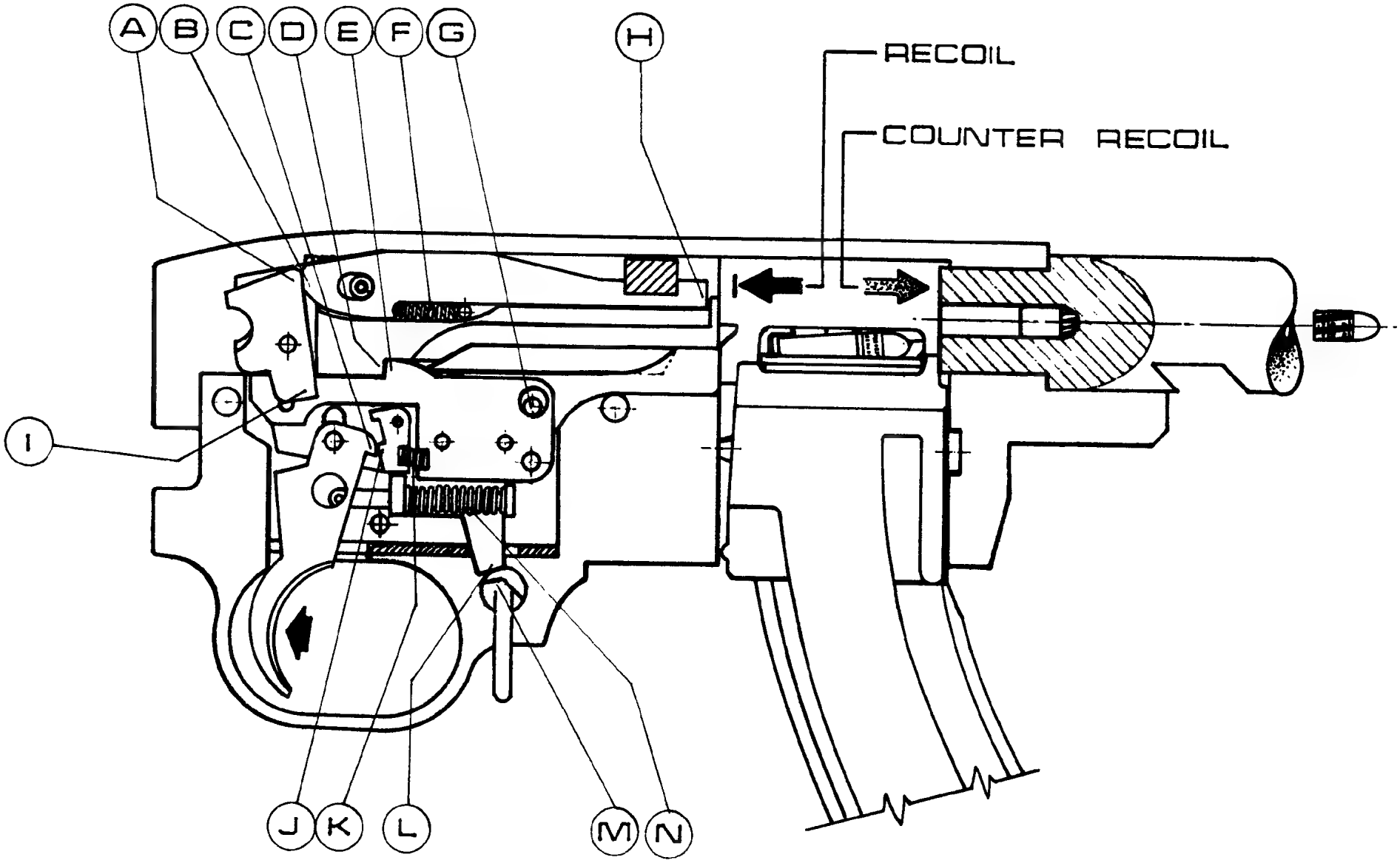
Further pressure on the trigger to overcome this slight hesitation will cause disengagement of the trigger hook (C) and trip mating step (J). Once the two parts are disengaged, the sear will then rebound to its normal elevated position ready to catch the bolt on its rearward recoil.

After the shot is fired, the bolt will recoil rearward to extract and eject the empty shell. At the bolt's full rearward travel, the sear nose (E) will catch the bolt step (D), stopping the bolt and holding it in the open position. With the trigger still held back and the sear in its normal position (already engaged with the bolt), it is necessary to release the pressure to fire the next shot so that the trigger hook (C) can reengage with the trip mating step (J). The trigger will then move forward under the tension of its spring (N) to its normal forward position, reengaging its front hook (C) with the trip mating step (J). The trip is powered by an extra-strong spring (K) for positive grip upon the trigger hook (C).

After the trigger hook (C) has reengaged with the trip mating step (J) as a result of releasing the trigger, pressing the trigger again will fire the next shot.

The sequence of operations described above will be repeated each time a shot is fired until the magazine is empty or until pressure on the trigger is released.

SEMI AUTOMATIC OPERATION



FULL AUTOMATIC OPERATION

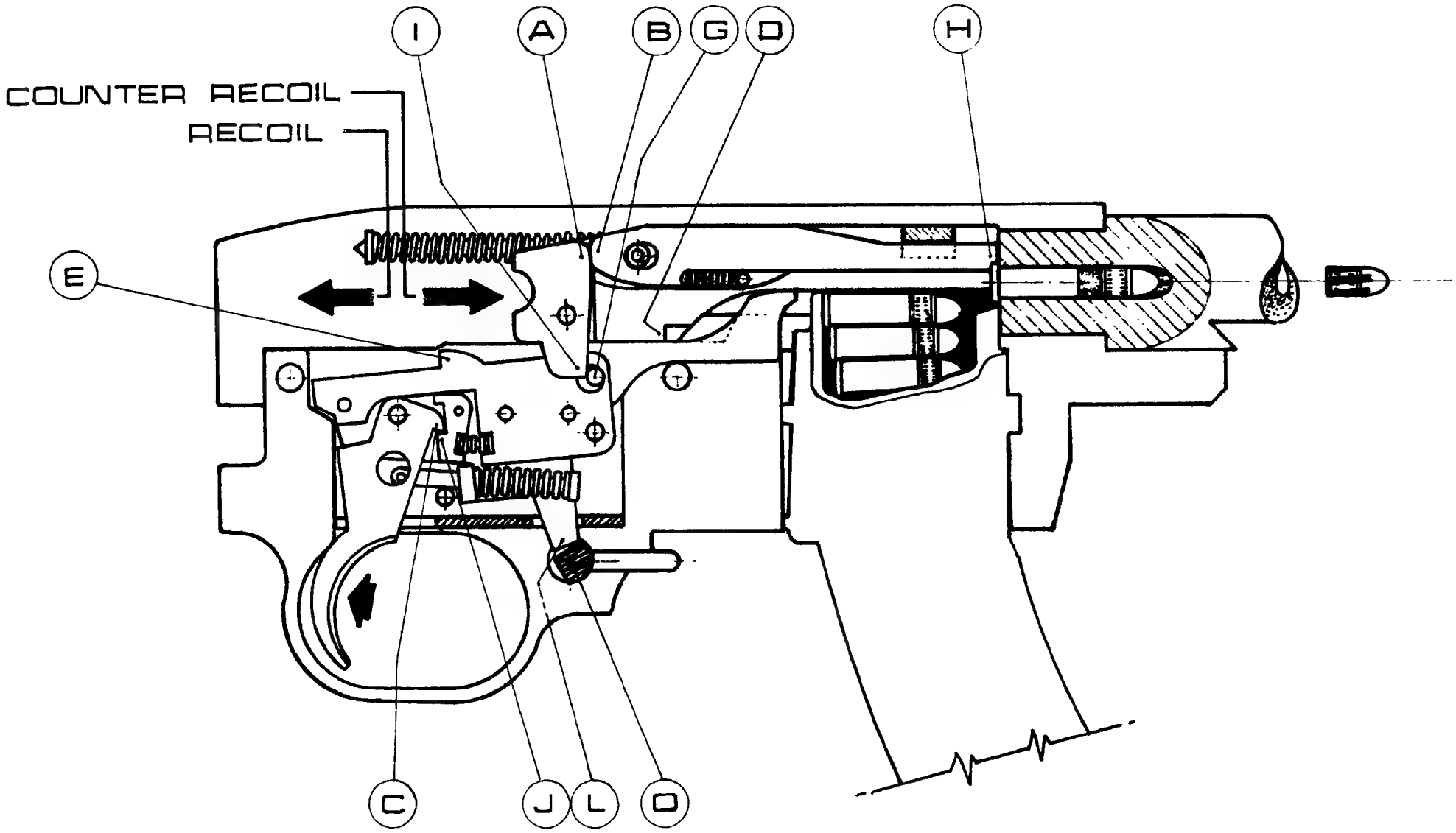
The sequence of operations for full automatic firing is much the same as the semiautomatic with the exception of the following: With a loaded magazine in place, set the selector to "full automatic" position by rotating the selector forward. In this position, the deep notch (O) of the selector pin is now parallel to the sear lower part (L). Now draw the cocking handle to the rear until the bolt step (D) is caught by the sear nose (E) holding the bolt in open position.

Pressure on the trigger will automatically cause the trigger hook (C) to depress the trip mating step (J), forcing the sear downwards and releasing the bolt forward. The bolt will then strip the top round and slam it into the chamber. When the bolt is fully closed, the lower part of the pivoting hammer (I) will hit the ejector pin (G), causing its upper part (A) to hit the rear end of the firing pin (B). This in turn causes its front tip to hit the rim of the now-chambered round resulting in firing of the weapon.

Note that the lower part of the sear (L) is not touching the deep notch of the selector pin (O), therefore there is no disconnection between the trigger hook (C) and the trip mating step (J). While trigger pull is maintained in this sequence, the sear is depressed by the trigger via the trip step. Therefore it will not reengage with the bolt on rearward recoil. This results in full automatic operation.

The sequence of action described above is repeated automatically until the trigger pressure is released or until the magazine is empty.

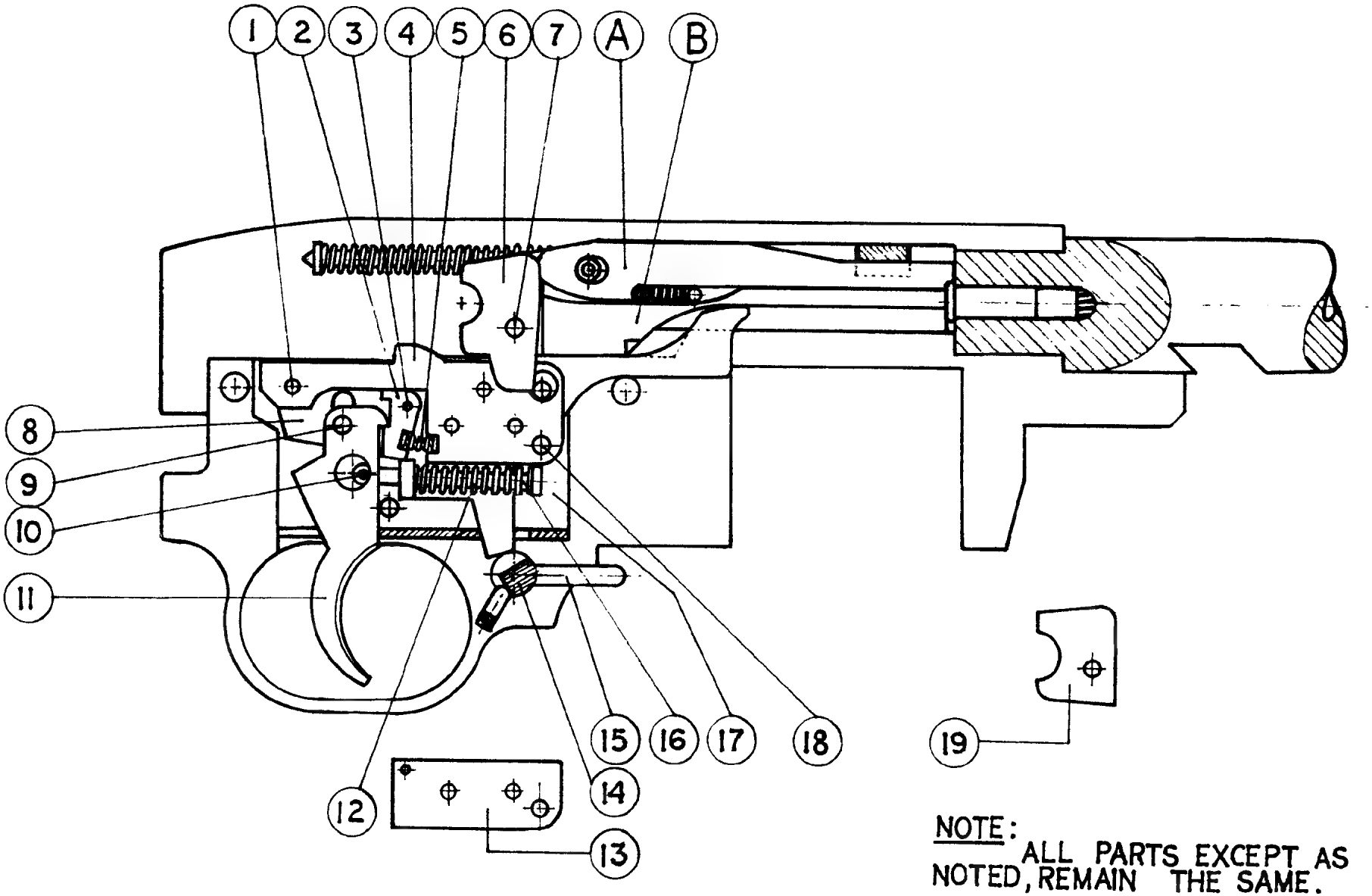
FULL AUTOMATIC OPERATION



1022 CONVERSION PARTS FUNCTIONS

1. SEAR RIVETS—secure the three-piece sear to perform as one basic part. This compensates for simplified manufacturing techniques.
2. TRIP—acts as a bridge between the trigger and the sear. The trip hook will engage and reengage with the trigger hook during trigger pull and also act as a disconnector lever for the sear.
3. TRIP PIVOT PIN—secures the trip in place to sear pocket.
4. SEAR (center piece)—shaped to accommodate the trip assembly spring base. It provides the thickness required to compensate for the space inside the converter housing and cause the piece to fit flush.
5. TRIP SPRING—powers the trip. It is very important to ensure that this spring is powerful enough to have a positive grip with the trigger hook. A weak spring will not operate the sear/trigger connection reliably and the bolt may not be released forward when the trigger is pressed.
6. HAMMER—pivoting type that is assembled to the rear of the bolt. Its lower portion hits the ejector pin on the bolt closure, firing the chambered round.
7. HAMMER PIVOT PIN—secures the hammer to its seat in the bolt.
8. SEAR (left piece)—acts as a base for the sear/trigger spring for assembly (bent part). Its lower front portion acts as a safety to act against the selector pin.
9. TRIGGER PIVOT PIN -retains trigger in assembled converter housing.
10. SEAR/TRIGGER SPRING GUIDE RETAINING PIN—retains the powerful spring that powers the sear and trigger during assembly.
11. TRIGGER—depresses the tripper when it is pulled. In turn the tripper causes the sear to move down and release the bolt forward to load and fire the weapon.
12. SEAR/TRIGGER SPRING—powers both the sear and the trigger.
13. SEAR (right piece)—secures the trip assembly to the sear.
14. SELECTOR LEVER PIN—acts as a block on "safety" position and as a selective-fire control for semi or full automatic depending on setting selected by the operator.
15. SELECTOR LEVER—a metal flap connected to the pin so that the selector can be manipulated conveniently from any selective-fire setting.
16. SEAR/TRIGGER SPRING GUIDE—part into which the spring is inserted. In turn this secures the sear to the trigger forming one basic subgroup of components.
17. CONVERTER HOUSING—formed sheet metal housing into which the subgroup components of the conversion parts are assembled. This makes for quick assembly or disassembly into the original factory trigger housing frame without alteration to it.
18. SEAR PIVOT PIN—secures the sear in place to the converter housing during assembly.
19. FIRING PIN ADAPTER—a substitute part for the pivoting hammer assembled in the bolt for use with the original trigger components for nonselective closed-bolt firing.

CONVERSION PARTS NUMBERED



NOTE: ALL PARTS EXCEPT AS NOTED, REMAIN THE SAME.

MATERIAL SPECIFICATIONS–
CONVERSION PARTS COMPONENTS

1. SEAR RIVETS–3/32-inch diameter x 3/8-inch long drill rod. (Four are required.)
2. TRIP–1/8-inch-thick steel, preferably 4140 gauge. Heat treat part after fitting.
3. TRIP PIVOT PIN–1/16-inch diameter x .350-inch-long drill rod.
4. SEAR (center piece)–1/8-inch-thick steel, preferably 4140 gauge.
5. TRIP SPRING–.020–.025-inch diameter wire (piano wire spring). O.D. is .109. Maximum number of coils is eight and is subject to fitting as required. Stress relieved after forming. The Mini 14 or the M1 .30 caliber carbine ejector spring can be ordered from the manufacturer and is usable for this part. (See number of coils required.)
6. HAMMER–1/8-inch-thick steel, preferably 4140 gauge. Heat treat part after fitting.
7. HAMMER PIVOT PIN–1/8-inch diameter x .935-inch-long drill rod.
8. SEAR (left piece)–1/8-inch-thick steel, preferably 4140 gauge. Original thickness will be reduced to .115 on its left side after the bent part for the spring base is made. File the left side of this piece to specified thickness prior to temporary riveting.
9. TRIGGER PIVOT PIN–1/8-inch diameter x 1/2-inch-long drill rod.
10. SEAR/TRIGGER SPRING GUIDE RETAINING PIN–1/16-inch diameter x 1/4-inch-long drill rod.
11. TRIGGER–3/8-inch-thick steel plate, preferably 4140 gauge. Heat treat part after final fitting.
12. SEAR/TRIGGER SPRING–Ideal wire diameter is .030. Minimum number of coils is 20. Stress relieved after forming. If you cannot fabricate your own spring, the 1022 recoil spring can be cut for this purpose; minimum number of coils will be 23. Order a spare from the factory.
13. SEAR (right piece)–1/8-inch-thick steel, preferably 4140 gauge, but a mild steel is also usable. No hardening required except for the two other mating parts.
14. SELECTOR LEVER PIN–5/16-inch diameter x .950-inch-long drill rod.
15. SELECTOR LEVER–1/8-inch-thick steel. Mild steel is usable. (See assembly instructions.)
16. SEAR/TRIGGER SPRING GUIDE–This part is improvised from a 1/8-inch diameter x 1 1/2-inch-long steel nail. Best to case harden mild steel after fitting for maximum strength.
17. CONVERTER HOUSING–1/16-inch-thick mild sheet steel. Aluminum can be substituted and is easier to form.
18. SEAR PIVOT PIN–1/8-inch diameter x 1/2-inch-long drill rod.
19. FIRING PIN ADAPTER–1/8-inch-thick steel, preferably 4140 gauge. Heat treat part after final fitting. (For use when the original trigger mechanism is substituted for nonselective firing.)

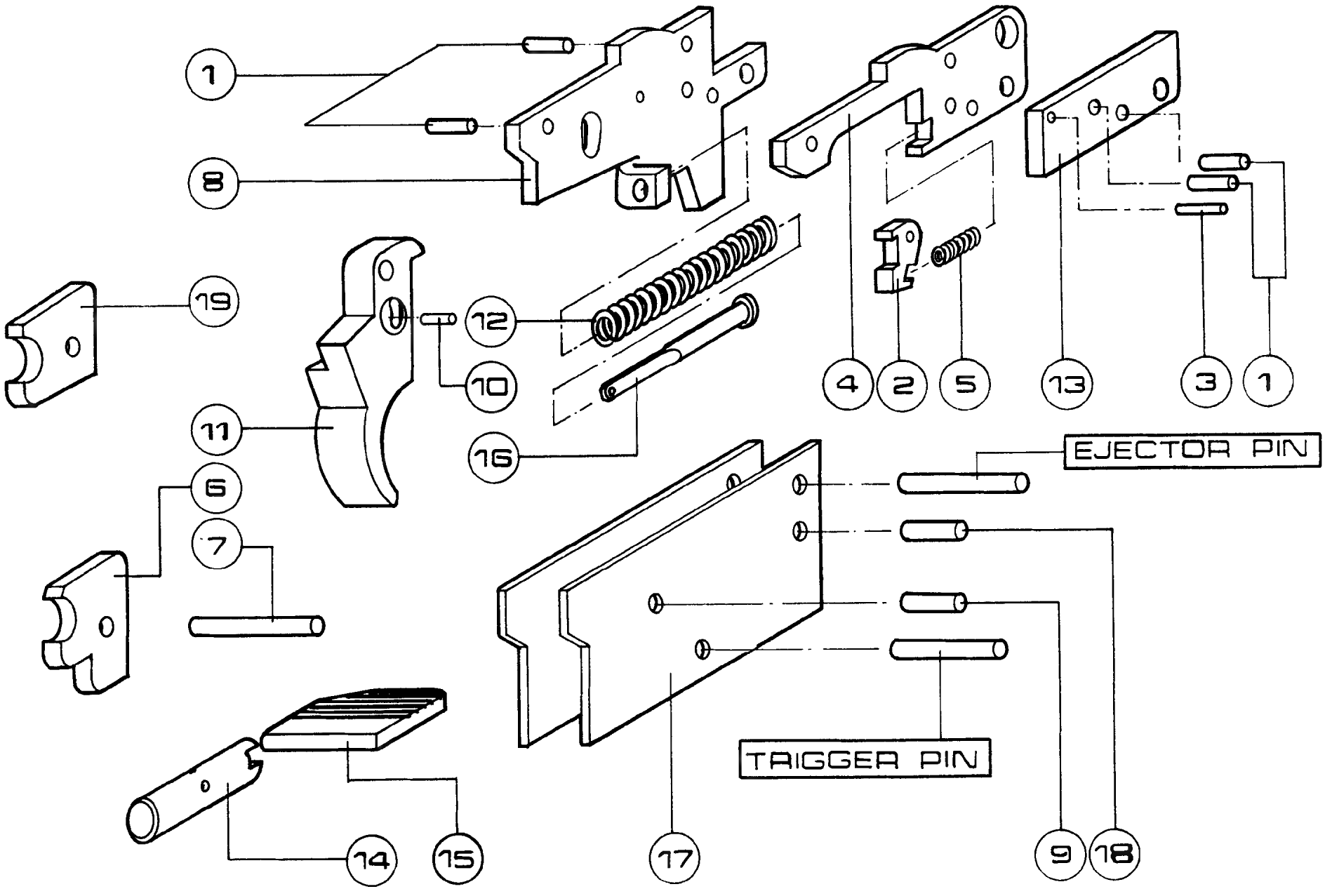
The following are recommended substitute parts to replace original components to ensure reliable performance of the selective fire model.

A. Cutdown modified original firing pin for the new pivoting hammer design.
B. Modified original bolt to accept the new pivoting hammer.

1. STRONGER RECOIL SPRING–.025–.030-inch diameter piano wire spring. Maximum number of coils is 42. Outside diameter of coil is .205–.207 maximum. The overall length when expanded (normal) is 6 inches.

The original recoil spring is too weak for reliable selective-

CONVERSION PARTS GROUP



fire operation. In the original hammer-fired system, when the hammer is in the fired position, it rests against the back of the bolt. Drawing the bolt to the rear you can feel that the resistance is heavy until the hammer is cocked, since the hammer (under spring tension) and the bolt (also under spring tension) are both resisting your pull. During the moment of discharge, the bolt is assisted by the hammer's impact against the backward pressure of the shell. This causes a delay in the bolt's opening and prevents the cartridge from rupturing since it is fully supported by the bolt face during rearward recoil hesitation.

In the conversion process, the rifle now fires in the open-bolt mode. Only the recoil spring supports the bolt since the hammer is omitted on the new mechanism. During cartridge detonation, with only the light recoil spring supporting the bolt, the incidence of cartridge case ruptures became more common since the normal hesitation imposed on the bolt by the hammer no longer occurred.

To remedy this dangerous situation, a heavier spring must replace the original recoil spring. If possible, the new substitute spring will be almost twice as strong as the original one for safe operation. It is very important that the cartridge rim be fully supported by enough inertia from the spring plus the weight of the bolt during the ignition of the cartridge primer to prevent the cartridge from rupturing, which could cause serious injury to the operator or bystanders.

2. STRONGER SELECTOR DETENT SPRING.

The original spring-loaded detent plunger is a bit too weak for the new replacement safety selector mechanism. The new selector lever mechanism has three position indexes: "safe"—lever pointing towards the trigger; "semiauto"—lever pointing downward in vertical position; and "full auto"—lever in full forward position. The disconnector system for semi-automatic functioning requires a securely locked selector lever so that the lower part of the sear that rides over the selector pin's shallow notch (for semiauto) will not force the pin to rotate when the trigger is pressed. If the selector index spring is too lightweight, the lower part of the sear will cause the selector pin to rotate forward a bit causing short burst or full automatic firing. If the selector index spring is strong, the selector pin will not move even when the sear's lower part rides heavily against it. It is advisable to replace the original factory safety detent plunger and its spring with a 1/8-inch diameter steel ball and a heavy spring of the same diameter.

If the original factory spring and detent plunger are to be used, the semi- and full automatic positions must be reversed. The "full auto" index will be the middle position, the "semi-auto" index will be the full forward position with the lever resting against the underside of the stock. This is necessary so that the selector pin will not rotate. Further rotation is prohibited by the stock. This type of selector arrangement is incorporated on the Russian AK 47 assault rifle and its current versions.

Another method for making a weak spring stronger is by the addition of an internal spring. Since the coil diameter needed for this part is 1/8-inch O.D., a very small coil spring is usable. This fine coil spring can be improvised from watch band connecting plunger springs. Watchband plungers are readily available from watch repair shops. The small spring is removed from the plunger tube by bending the plunger until it breaks off of the tube. Watchband plungers come in different lengths. Buy the longest size and cut it to the length desired.

This tiny spring can also be used as an internal duplicate for the trip spring. The trip will also require a strong spring in order to make positive engagement with the trigger hook. A weak trip spring will cause early disengagement and the sear cannot be depressed enough to release the bolt, which is held to the rear by the sear when the weapon is cocked.

This ultra short SMG configuration of the selective-fire Ruger 1022 features the fully adjustable .30 caliber M1 carbine rear sight and a custom built UZI SMG-type front sight with protectors machined from solid block of steel. The muzzle brake is a copy of the latest Russian AK-74 assault rifle device.

Right side view of the newly converted selective-fire Ruger 1022. This one sports a folding stock which is shown in the folded position. A 30-shot, banana-type clip and a 25-shot Eaton magazine are below. Selector is set at "full auto."

Photo showing size comparison. Top is the Green Berets' favorite--the Colt commando SMG .223. Bottom is the 1022--"The Poor Man's Rolls Royce .22 SMG." Note that even with the full buttstock, the 1022 is still dwarfed by the super-compact commando SMG. By cutting the buttstock on the 1022 and forming the pistol grip, one has an instant machinepistol the size of a KG-9 or a Mini UZI.

The ultimate 1022 weapon system. Photo showing the short SMG configuration with standard 18 1/2-inch barrel with flash hider, military sight system, 30- and 25-round clips (50-round drum magazines are now available) and side-mounted assault sling. The winner for the "affordable alternative" contest--a .22 rimfire full auto at its best!

A useful accessory for your Ruger 1022 is the ventilated handguard which is secured on top of the foregrip by four small screws. Its large vent holes allow for rapid cooling of the barrel during burst firing. This is important when shooting a selective-fire rifle since the thumb of the hand grasping the foregrip will ride over the barrel.

Top view showing detail of the ventilated handguard assembled on top of the foregrip. Note the detachable side-mounted sling on the left side of foregrip for the assault carry position. A clamp-type sling is easily attached to the barrel by its mounting screw and can be adjusted as the shooter desires.

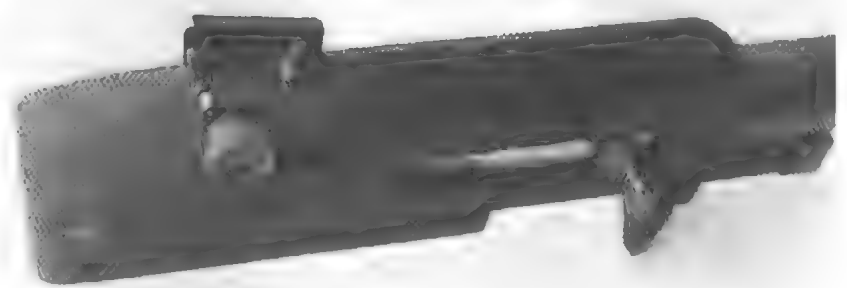
Close-up view showing the standard model (top) as it comes from the factory and the dressed-up, selective-fire converted model (below).

Right side view of the same two rifles, the lower gun with its folding stock visible. The standard model rifle (top) has its bolt held open by a hold-open device. The converted rifle has its bolt held open and "ready-to-fire" by the sear. Note the selector lever set at "semiauto."

Photo showing the fully adjustable, detachable sling swivel that neatly clamps onto the barrel for any mode of carry. Also pictured is the wide, nylon-padded assault sling.

Same weapon with sling placed under the weapon unhooked from swivel attachment.

View of the folding stock pistol grip cover hinged open. This compartment can easily accommodate spare parts for the conversion or store the original trigger mechanism.



Close up showing the top portion of the receiver. An original military .30 caliber M1 carbine adjustable sight was installed to the factory scope mount plate. A dovetail matching the sight's lug was cut on top of the scope mount plate for assembly.

Top view of the short barrel for SMG configuration. This one has the famous M16 birdcage-type flash eliminator. Note the solidly built front sight mounted on the dovetail.

The short barrel with various types of muzzle brake and flash eliminators. The barrel end was threaded about 3/4 inch to take all current M16 barrel attachments including the Sionics silencer for the .223 cartridge. The thread-on-type silencer featured in the *Home Workshop Silencers* (Paladin Press, Boulder, CO) can be adapted for the 1022.

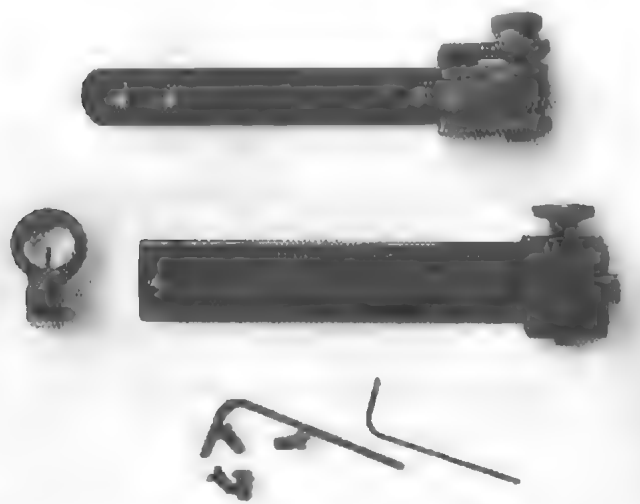
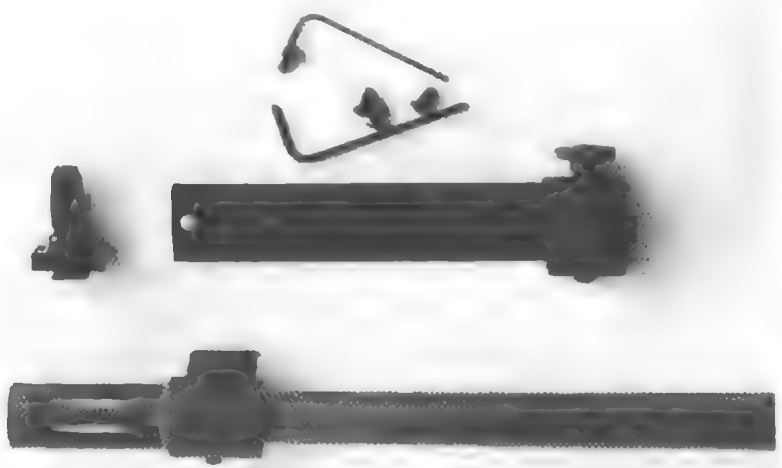
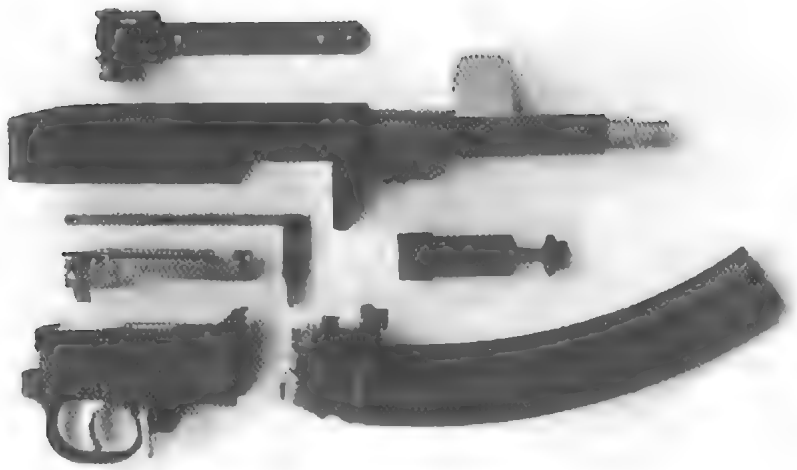


Photo showing the ultimate "military sighting system" for use on the 1022. At top is the M1 30 carbine military adjustable system mounted on a dovetail slot on top of the factory supplied scope base. Below is Feather Enterprise's innovative adjustable rear sight that is easily installed via the scope base supplied with the sight. Both the rear sights pictured will perfectly match the H&K front sight.



The replacement "military sighting system" is pictured with the excellent flash eliminator assembled on 1022 barrel with standard factory front sight.



Same weapon with subgroup disassembled including muzzle brake and rear sight.

Same weapon with subgroup disassembled for cleaning without stock.

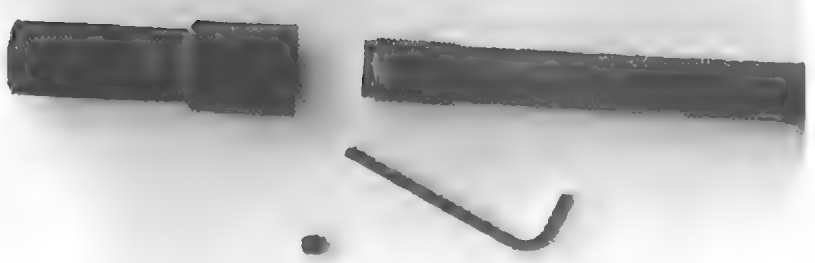
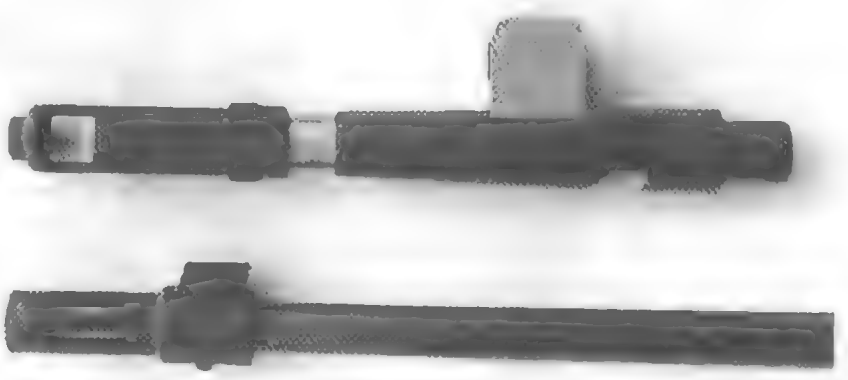


Photo showing the top slot of the 1022 flash hidor. This slot clears the front sight lug during assembly and is permanently secured by a small set screw.



Muzzle brake comparison between the short and standard length barrels. The top one has the AK-74 muzzle brake threaded on while the lower one is slid in place and retained by a set screw. Both muzzle brakes are fully machined.

Close-up view showing the trigger being pressed. The selector is set at "semiauto." The bolt is still held in open position as engaged with the sear. Note that there is still about 3/16 of an inch left before the trigger is pressed fully to the rear. Further pull will release the bolt forward to fire the weapon. The trigger must be released forward for the trigger to reengage with the sear trip to fire the next shot.

Close-up view showing the trigger fully pressed. In the shooting sequence, the weapon fires the first shot, the sear bounces back to its normal upward position after disengaging from the trigger and catches the bolt after it recoils to the rear once the shot is fired.

The trigger housing unit has been removed from the receiver to show the relationship of the trigger components when fired on "semiauto." The trigger is about to be pressed. The top of sear nose is well above the trigger housing frame.

Photo showing the trigger not quite fully depressed. Note that the sear lug is now below the top level of the trigger housing and the bolt has been released. The remaining trigger pull will allow the disengagement of the trigger and sear trip.

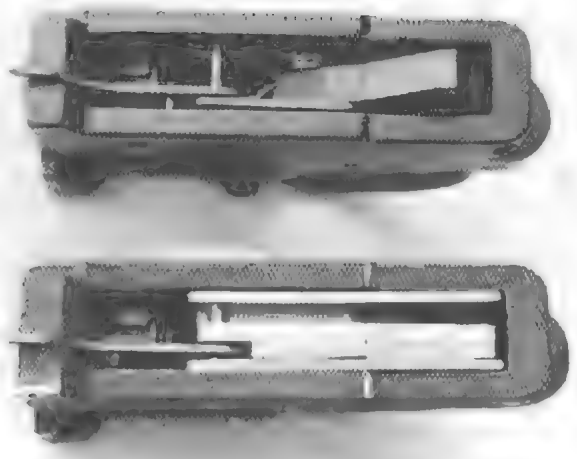
The trigger is now fully pressed. Note that after the disengagement of the trigger and sear trip, the sear bounces back to its normal position to catch the bolt on its rearward recoil. To fire the next round, the trigger pull must be released.

Close up showing the trigger fully pressed. The bolt slammed forward chambering the top cartridge from the magazine and fired it when the bolt fully closed. In this position, the deep notch of the selector pin is parallel to the lower portion of sear and not resting against it. This totally prevents disconnection of the trigger and sear and results in automatic fire.

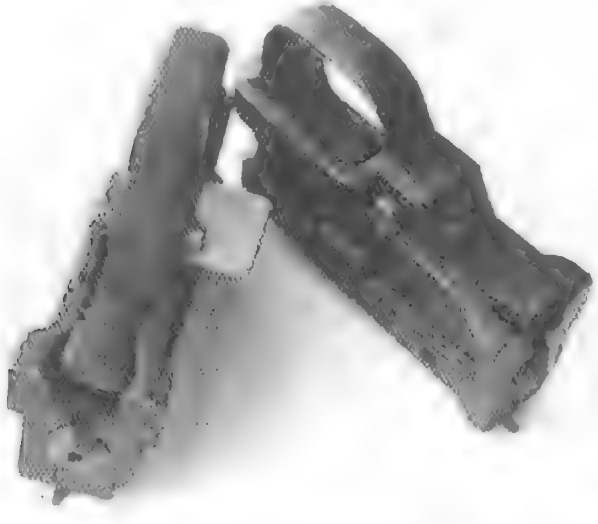
View showing the top of the factory trigger housing frame. Note that with the exception of the original magazine catch assembly, all other factory parts were removed so that the "drop-in" selective-fire conversion unit can be assembled in place. The replacement selector is shown in place.

Here the "drop-in" selective-fire conversion unit is shown on top of the trigger housing frame ready for insertion. The ejector, its pin, and the original factory trigger pin are pictured. These two pins are inserted to hold the conversion unit in place.

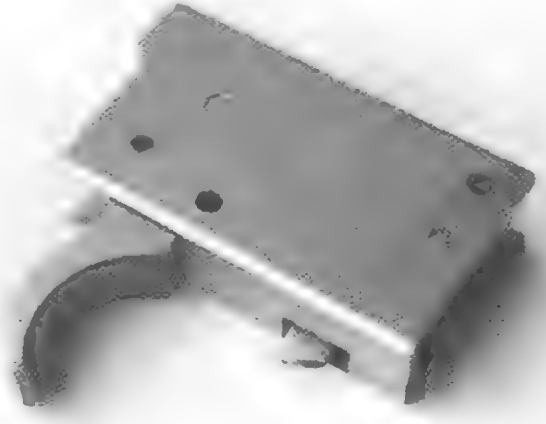
Top view showing the converter mechanism assembled inside the factory trigger housing frame. Note the sear clearance for the ejector. Note also the gap on the right side of the sear where the lower part of the hammer will travel during operation.



Top view comparison between the original trigger mechanism (top) and the new selective-fire model (below).



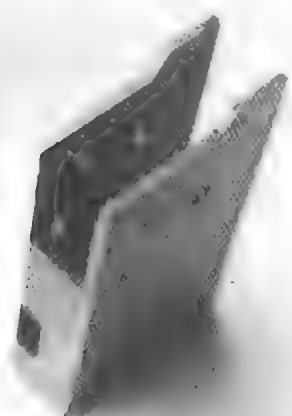
Bottom view showing the trigger housing assembly of the push-button-type safety of the factory (right) and the easily manipulated selector-lever-type of the converted model (left).



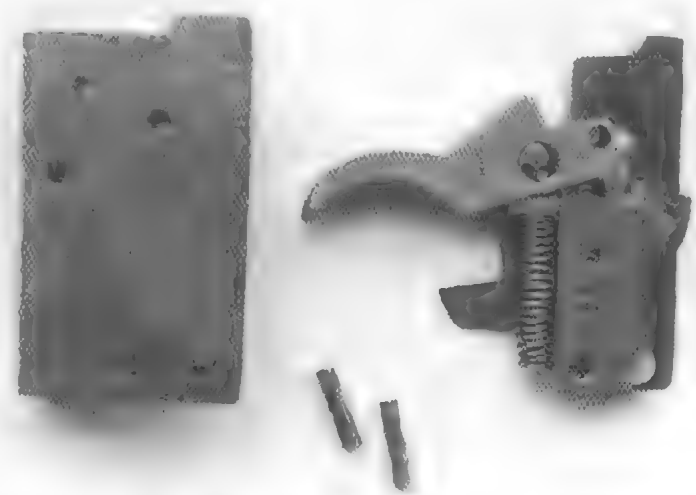
Perspective frontal view showing the "drop-in" conversion unit fully assembled. Note the small rectangular slot on the bottom front of the converter housing where the lower part of the sear is protruding. The unit can be dropped in or removed in a few seconds and requires no modification to the frame.

View showing how the conversion unit will seat inside the trigger housing frame. Note that the ejector is also assembled in place.

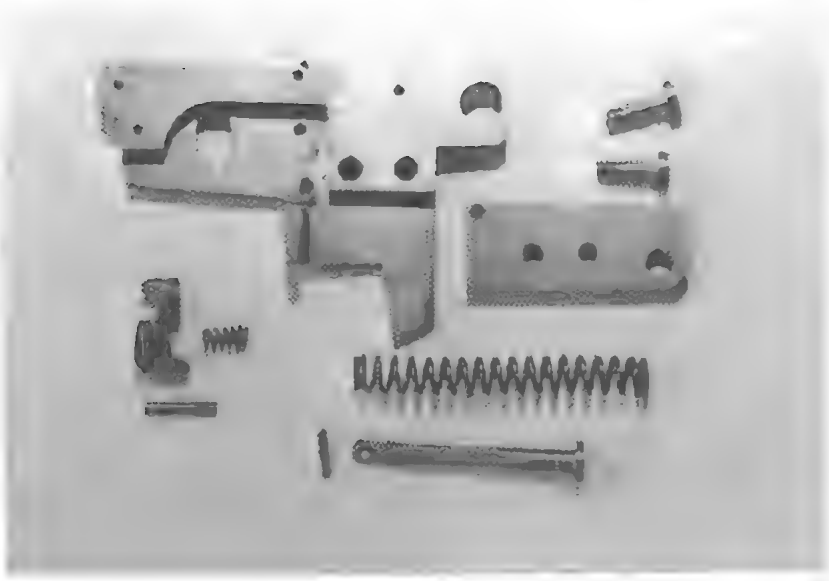
View showing the conversion unit assembled in place inside the trigger housing frame. Note the sear nose protruding on top of the frame.



Detailed rear top view showing the conversion unit housing improvised from a rectangular piece of tubing with external measurements of 1/2 x 2 inches of 1/16-inch sheet metal. This material is commonly used by furniture manufacturers.



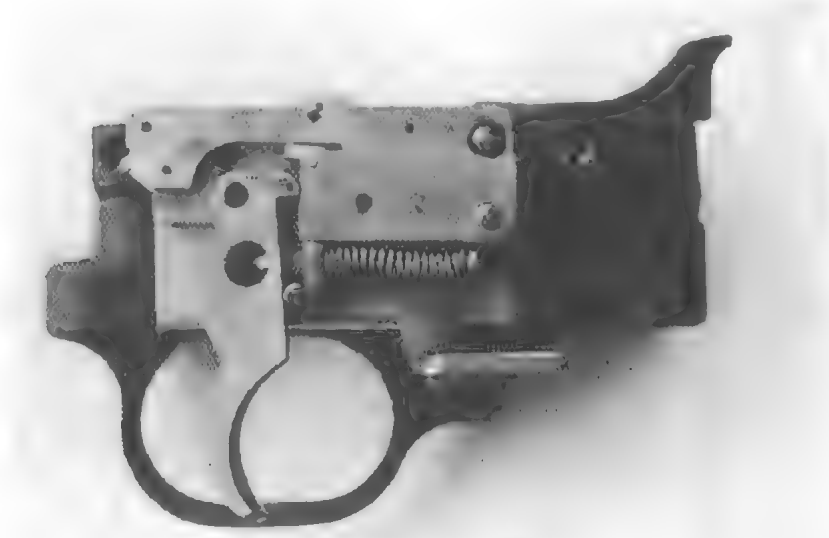
A view of the partially disembled conversion unit. The two 1/8-inch diameter pins securing it to its housing were removed. These two pins act as pivot pins for the sear and trigger.



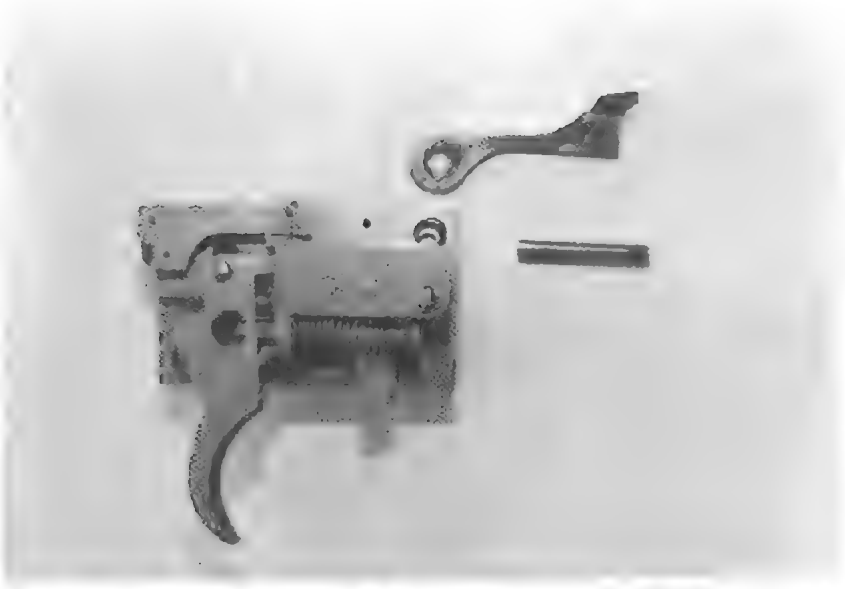
View of the stripped conversion mechanism.

Top view of the fully assembled conversion unit. Note the clearance gap on the right side of the sear for hammer travel during operation.

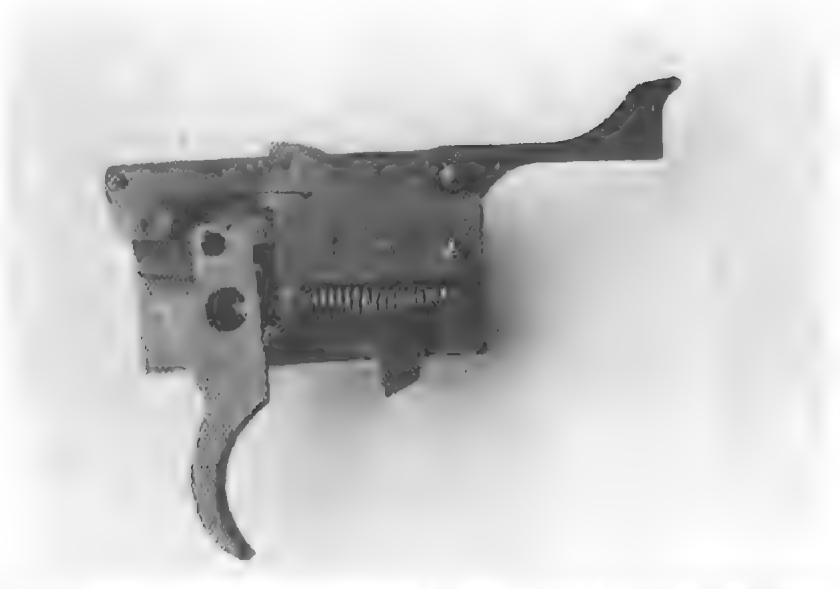
Perspective top view showing the conversion unit fully assembled. Note the sear nose protruding on top of the conversion housing. The sear is constructed from 1/8-inch steel plates riveted together and can be handbuilt using common hand tools.



A detailed view showing the conversion mechanism outside the trigger housing frame. Assemble the mechanism while you are fitting the parts so you can see their proper relationship.

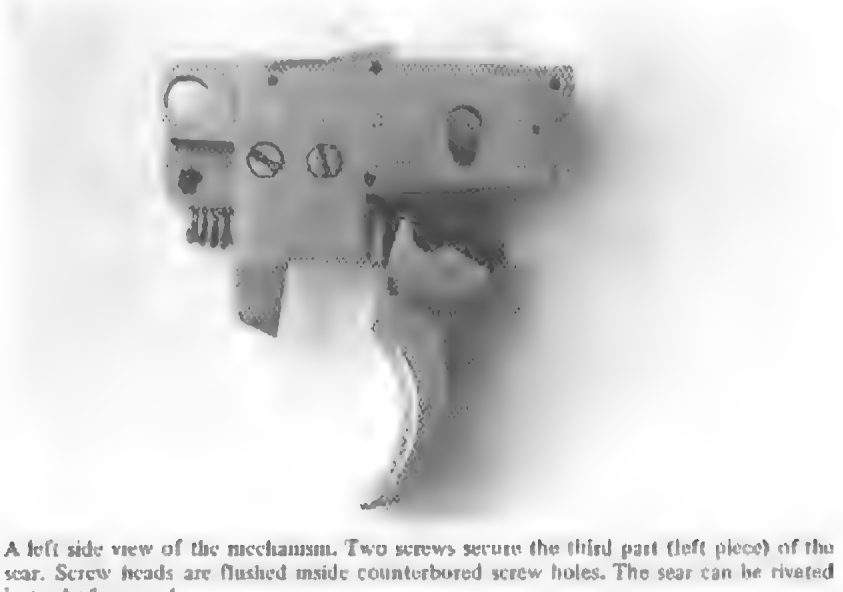


View of the conversion mechanism with the ejector disassembled. The ejector pin is assembled last and inserted in its usual hole.

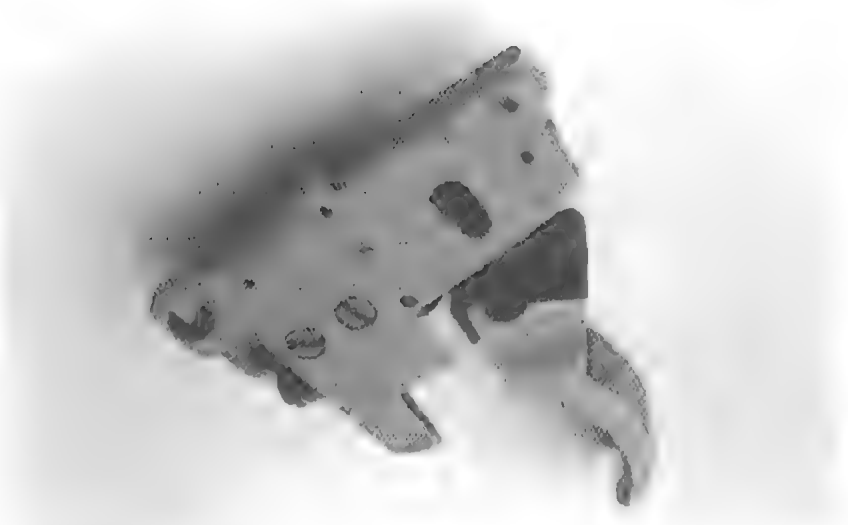


View of the conversion mechanism inside the conversion housing as secured bythe trigger and sear pivot pins. The ejector is also assembled.

A right side view of the conversion trigger mechanism fully assembled as one unit.



A left side view of the mechanism. Two screws secure the third part (left piece) of the sear. Screw heads are flushed inside counterbored screw holes. The sear can be riveted instead of screwed.



Top rear view showing the conversion trigger mechanism fully assembled. Note the step on the top left side of the trigger where the left piece of the sear is resting. This step allows clearance for sear action. The oblong slot on the rear portion of the sear allows clearance for the trigger pin and sear motion.

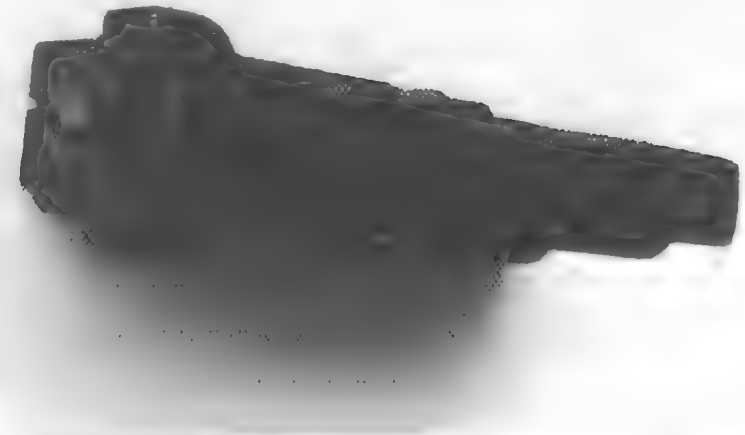
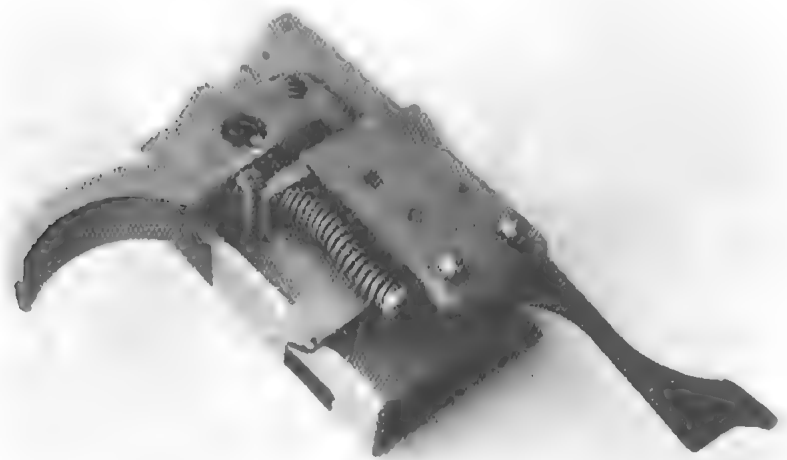
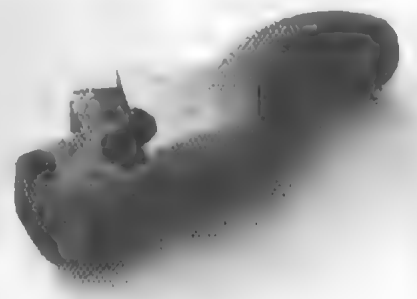


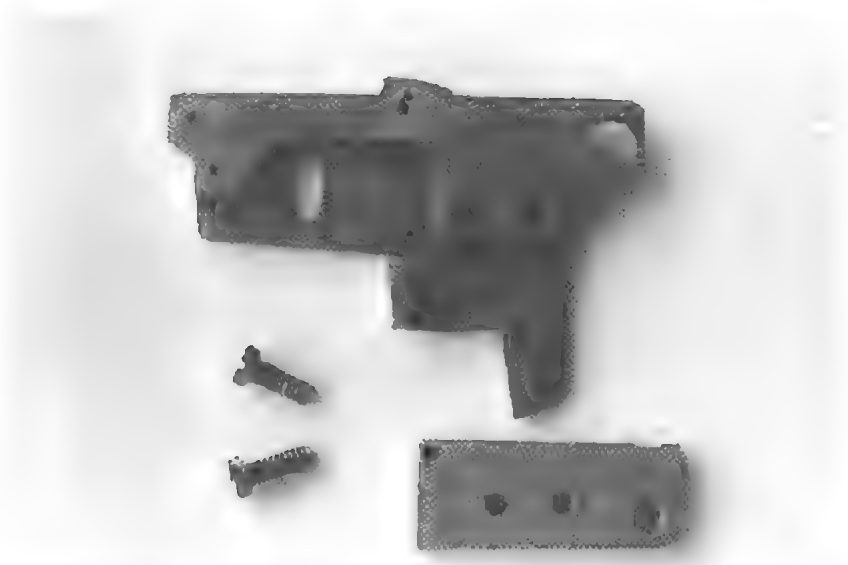
Photo shows the slave pin assembled in the selector pin hole. This pin must be in place prior to assembling the weapon to the stock. After the gun has been assembled to the stock, and the stock screw has been tightened, the slave pin is pushed out by the selector lever pin.



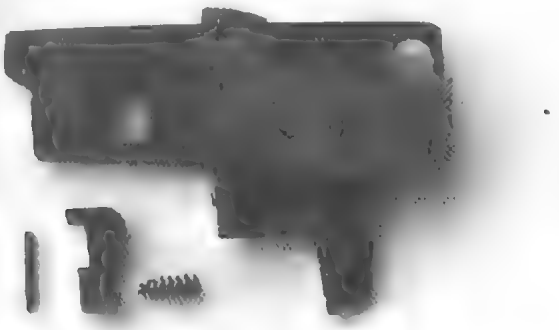
The conversion mechanism fully assembled and placed on top of its housing with the ejector also assembled in place. Note that the four retaining pins are precisely positioned.



Left front view showing the trimmed upper step of the trigger for sear's left piece clearance. Note the oblong slot in the front face of the trigger where the trigger/sear spring guide is inserted

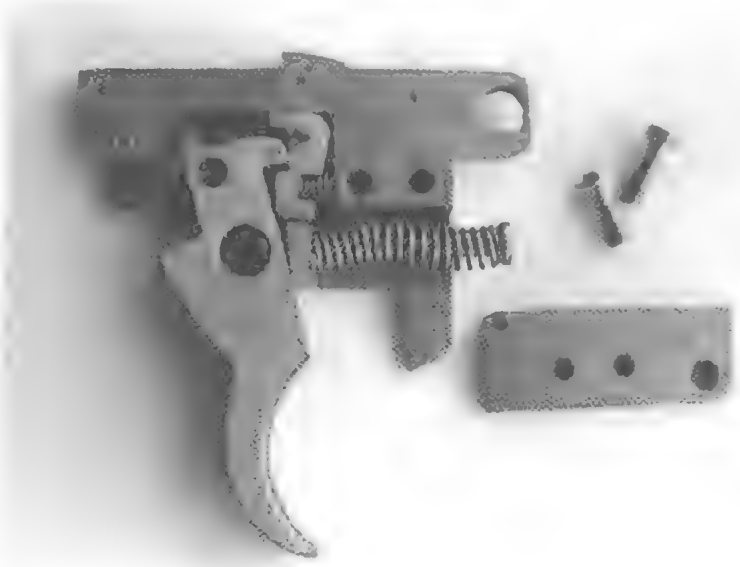


Close up showing a handmade three-piece sear. Parts are cut with a hacksaw then roughly shaped by files before being riveted. After fitting, parts are heat treated and polished.



Sear group is shown disassembled. The trip and its spring are removed from the sear. Here a small internal spring is improvised from watchband plunger spring and inserted into the normal spring for additional power.

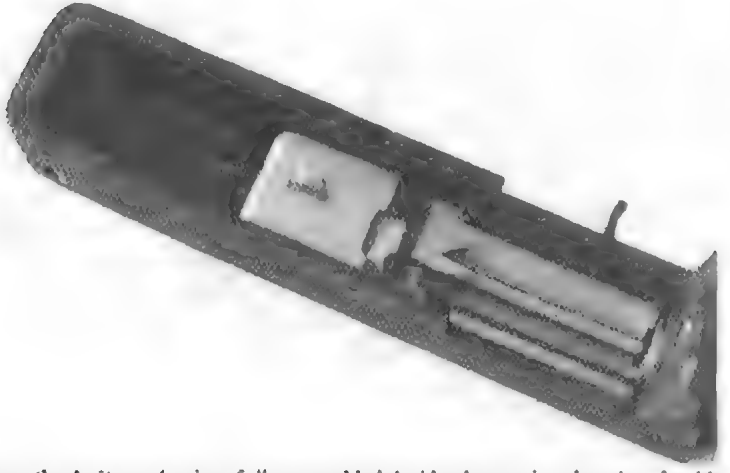
View showing the proper assembly of the sear/trigger spring rod. In this view, the spring rod (without the spring in place) is inserted into the oblong slot of the bent part of the sear, then into the other oblong slot on the front face of the trigger. The end of the rod has a hole into which a small pin is inserted to retain the spring assembly in place.



View of the sear/trigger assembly with the spring rod and spring in place.

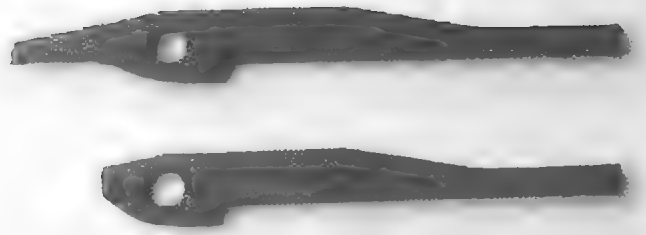
View showing the sear/trigger spring and its guide rod.

View showing the spring guide rod and a 1/8-inch diameter nail like the one from which it was improvised. The nail was cut and its head was trimmed to the O.D. of the spring. After its front end was filed flat on both sides, a 1/16-inch hole was drilled for the spring unit retention.



View showing the bolt mechanism fully assembled inside the receiver housing. In this view, the pivoting hammer design used for selective-fire is installed, and the hammer's lower part protrudes underneath the bolt rear end. The lower protrusion of the hammer in the underside of the bolt will hit the ignition shoulder (ejector pin) during bolt closure to fire the weapon.

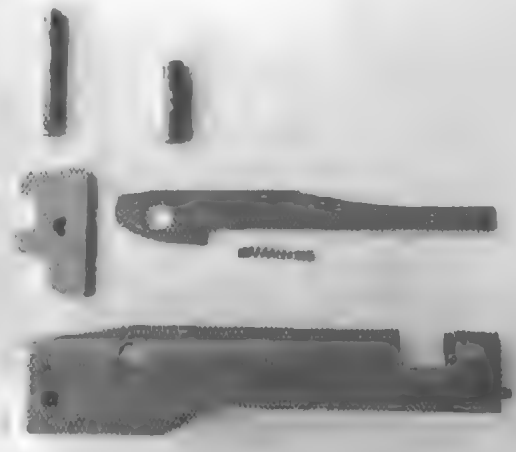
Close up showing the new pivoting hammer design for selective-firing (left) and the firing pin adapter (right) for nonselective firing using the original factory trigger mechanism with the modified bolt.



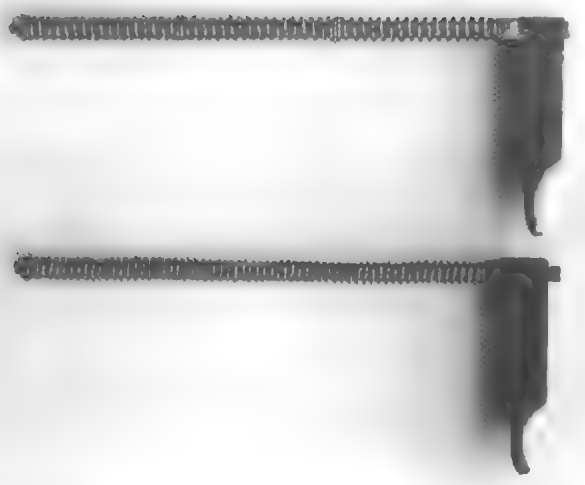
View showing comparison of the original factory firing pin (top) and the modified shortened one (bottom) to mate with the new pivoting hammer design used for the selective fire conversion. The rear end of the original factory pin is subject to peening on its tapered, fragile end. The modified firing pin is almost twice as thick for heavy-duty use.

Close up showing the front end of the firing pins for comparison. The left one is bevelled for more positive ignition. The right one is original.

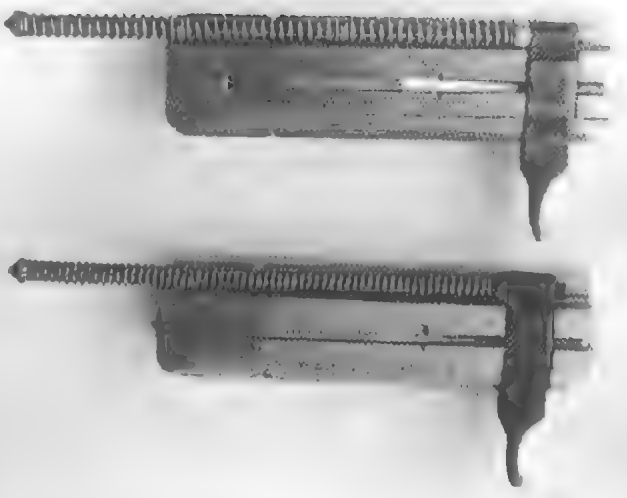
Bolt assembly but with the firing pin adapter substituted for the original factory trigger mechanism.



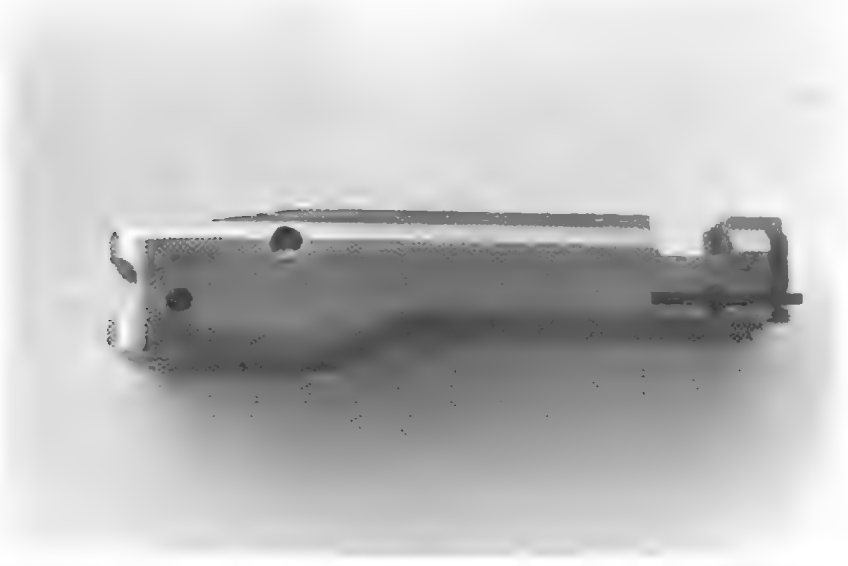
View showing the completely disassembled bolt.



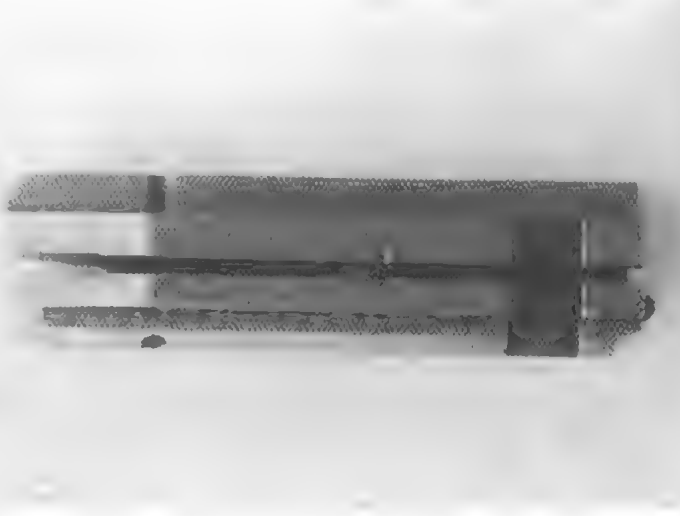
View showing two types of recoil spring assembly. The top one has larger diameter wire spring using the same cocking handle and guide rod assembly. The lower one is the factory original. The stronger recoil spring performed flawlessly using high-velocity ammunition, but low-powered ammo will not cycle the bolt when the more powerful recoil spring is used.



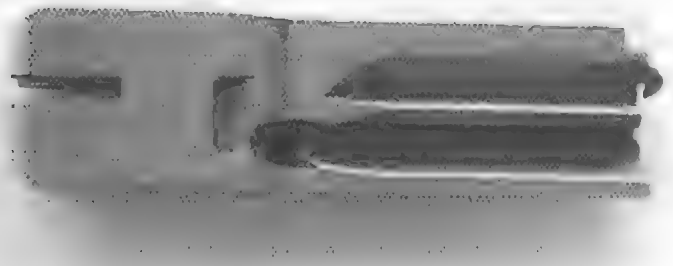
View of two recoil spring assemblies as installed to the modified (top) and unmodified (bottom) bolts.



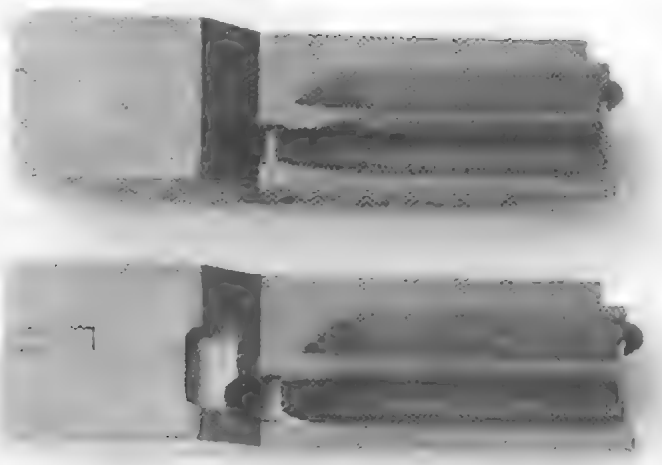
Right side view showing the modified bolt. Note the 1/8-inch diameter hole drilled on the bolt rear end for the hammer pivot pin.



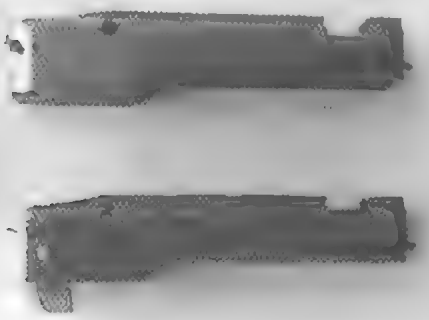
Top view showing the modified bolt. Note the long slot at the rear end where the pivoting hammer is assembled. To make this slot, assemble three blades in your hacksaw and cut a straight line following the firing pin assembly grooves. The rough hacksaw cut is finished with a flat file.



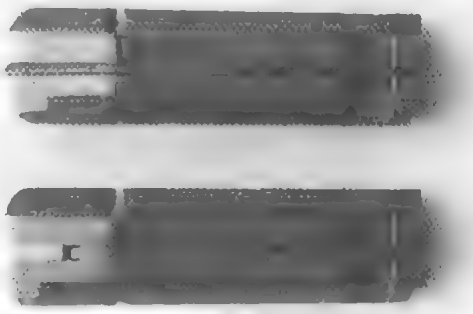
Bottom view showing the modified bolt. Note the length of the rear end slot for the new pivoting hammer assembly and also the milled step for the sear nose engagement. If you don't have a milling machine, take your bolt to a machinist to have the portion that is in line with the sear nose milled about 1/8-inch deep so you can use the modified bolt with your original factory trigger group. Or order a spare bolt from the factory. A new bolt will cost less than having the bolt worked by a machinist.



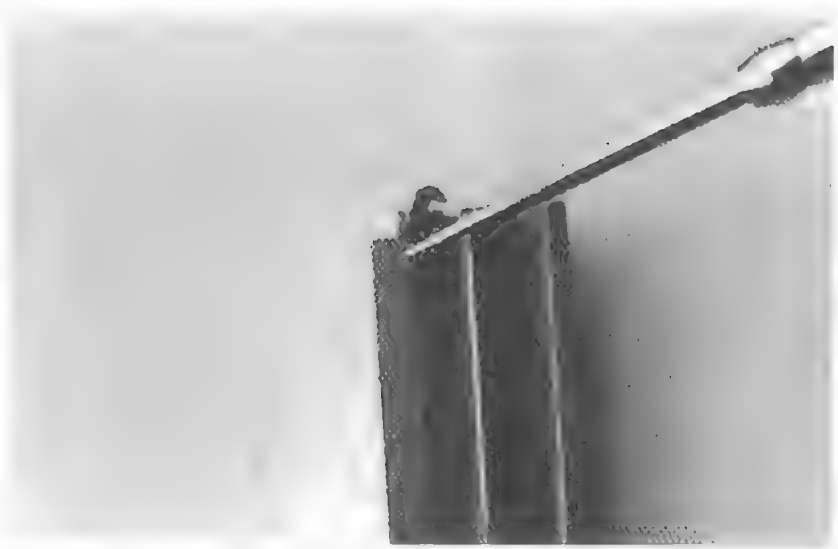
Close-up bottom view of the same two bolts. The lower modified bolt has the firing pin adapter assembled in place for the nonselective firing mode. The lower part of the adapter must be flush to the underside and the rear end contour of the bolt to ensure unimpeded cocking action of the original factory hammer.



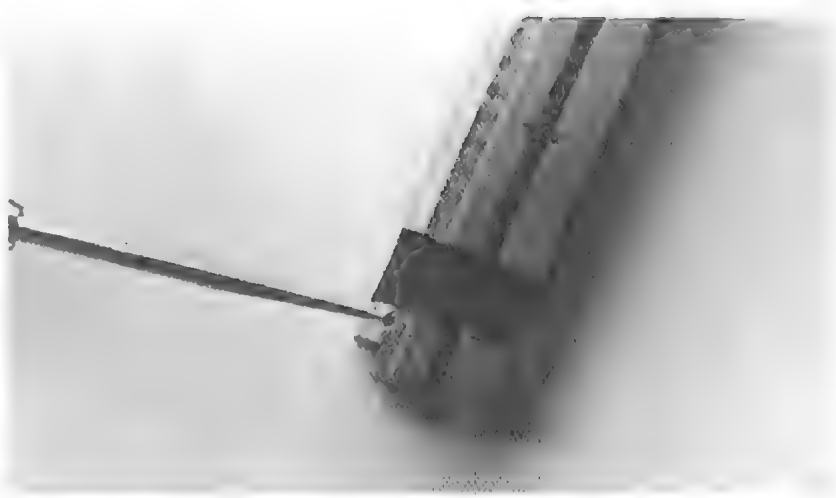
Right side view showing the original unmodified bolt (top) and the modified bolt (bottom) for selective-fire mode. Note the pivoting hammer protrusion underneath the rear end of the modified bolt.



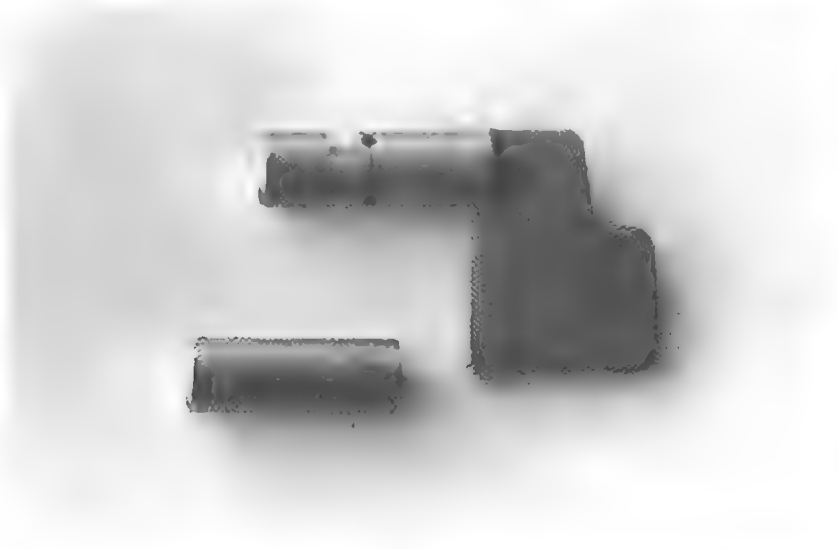
Top view of the same two bolts. Note the two-piece firing pin employed on the selective-fire mode.



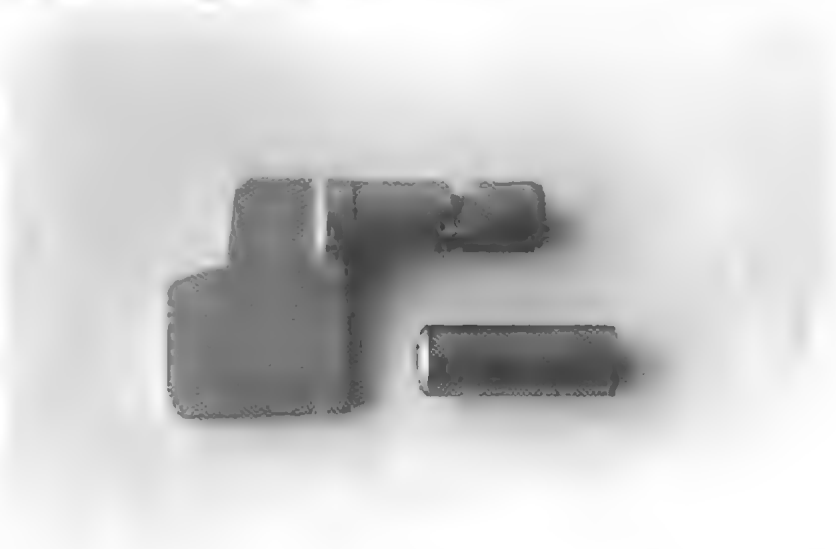
The scribe points to the drilled 1/16-inch diameter hole at the rear front portion of the bolt. This has a roll pin pressed fitted in place. The pin (positioned vertically at the right side of the extractor) will retain it in its seat on the bolt in case of ruptured rim malfunctions. This precaution must be undertaken before firing the weapon with live rounds.



Scribe points to the top end of the drilled hole. Before drilling the hole, the bolt must be annealed on the portion that is to be drilled. Tap a snuggly fitting drill rod inside the extractor plunger assembly hole and into a metal plate. The plate must fit tightly when assembled to the extractor groove to prevent the drill from shifting or breaking while drilling the offset hole. Drill the hole from the bottom part of the bolt and pierce through the top. To find the right location for drilling, the extractor must be retracted until its hook clears the counterbored front face of the bolt accommodating the rim of the shell. (See drawing specifications.)



View showing the replacement safety selector and its slave pin. This is used prior to assembling the rifle to stock. Note the two index holes and the shallow notch for semi-auto firing.



Same selector and slave pin showing the deep notch for full auto and the third index hole. The lever flap must be wide and long for fast manipulation by the shooting finger.

2. The Replacement "Drop-In" Selective-Fire Conversion

In designing this selective-fire conversion for the Ruger 1022, primary consideration was given to making the conversion as simple and efficient as possible. The result is a drop-in unit which can be installed or removed in seconds, requires no alteration of the receiver or trigger housing, and can be fabricated with common hand tools. These design features were carefully researched, constructed, and tested to ensure their proper functioning and reliability.

The drop-in converter mechanism is simplicity itself. It is totally handmade using only common household tools. Over 5,000 rounds were fired through the perfected prototype and not one of the handmade parts broke down or had to be replaced. Proper fitting, heat treatment, good quality steel, and a good finish on all working parts is a must for making your Ruger 1022 an excellent defense gun. Also proper care and regular maintenance must be performed to ensure trouble-free functioning at all times.

The drop-in automatic converter is assembled as a single unit that replaces the original trigger components. It consists of a three-piece sear that is riveted together to function as one part. The sear is very sturdy, and with good steel and heat treatment, it can easily outlast the gun. The trigger is also part of the drop-in unit and is constructed of 3/8-inch-thick steel plate. The trigger is simple to build using common hand tools. The complete converter mechanism is assembled in a fabricated 1/16-inch-thick sheet metal housing using a handbuilt die.

3. The Simplified Three-Piece Sear

To avoid intricate milling and expensive fixtures in constructing the sear, the sear was designed as a three-part unit. It is constructed from three pieces of steel plate each 1/8-inch thick which are individually cut using a hacksaw. After the pattern has been cut, it is finished to its final shape with appropriate files.

The three parts are then temporarily riveted together using 1/16-inch diameter nails to form the basic configuration for final fitting. It is best to rivet the parts together before drilling the pivot holes and slot to prevent misalignment. To ensure a precise fit in relocating the sear pivot holes and making the slot for sear movement clearance, the converter housing frame should be constructed and the appropriate trigger and sear pivot holes drilled beforehand. The square slots underneath the housing must also be cut for the trigger and lower part of the sear insertion allowance before the sear pivot holes and slot can be relocated.

Once the converter housing is constructed, the sear can be inserted. With the top of the sear nose protruding above the housing and the lower portion of the sear nose level with the top wall of the housing, the exact location of the sear pivot holes and the required slot can easily be determined. With the sear held in its normal position inside the housing, insert a 1/8-inch diameter drill in the sear pivot hole on the converter housing and mark the exact location on the right side of the sear by hand turning the drill. This will mark the exact location of the pivot hole on the sear. With a 1/8-inch diameter bit drill the center of this mark, which is where the pivot pin will be assembled.

Next prepare three drill rods 1/8-inch in diameter by 3/8-inch long to be used as pivot guides when relocating the remaining hole (ejector pin clearance) and the slot (trigger hole clearance). To find the exact location for the hole and slot, reinsert the sear into the converter housing and secure it in place with the sear pivot pin. Restrain the sear in the same manner as when the first hole was drilled; the sear nose will protrude from the top of the housing. Use a 1/8-inch diameter drill to mark the location of the ejector pin clearance hole and the trigger pivot hole. Remove the sear from the converter housing and drill the marked areas. Then reassemble the sear, making certain that the holes properly align with the holes in the converter housing by inserting the two other pins. If they align, remove the sear and enlarge the ejector pin hole using a 3/16-inch diameter drill. The hole enlargement is necessary so that the sear can move down when the trigger is pressed. If this hole is not enlarged, the sear will be locked in place.

The hole in the rear portion of the sear will have to be enlarged in an oblong pattern. This is done by drilling another 1/8-inch hole just above it, then joining the two using a small, round needle file. The upper part of the oblong slot will be slightly larger than the original 1/8-inch diameter so that the

trigger pin will not be rubbing tightly against it when the sear moves down as the trigger is depressed. The lower part of the oblong slot controls the elevation of the sear nose above the converter housing and can be adjusted by enlarging it slightly if the elevation is enough for positive bolt engagement with the sear nose. If the sear needs to be elevated further, make sure that you trim the step of the tripper to maintain perfect alignment for reengagement with the trigger hook. Remember that the trip step will automatically elevate when the sear is fully elevated.

For fitting purposes, assemble the mechanism outside the converter housing so that you can see if the parts are mating properly. (See photo with mechanism assembled on top of converter housing for assembly guidelines.)

Once all trigger components are fitted, replace the temporary nail rivets with drill rods. Make sure you countersink the rivet holes on both sides so that they can be peened flush with the surface of the sear. Before the final riveting of the three-piece sear, deburr all edges of the cut with fine emery cloth. Heat treat the part after riveting. For maximum strength, the three-piece sear can also be brazed together after riveting.

4. The Trigger

Before cutting the pattern in metal, make a full-scale template for the trigger by tracing the full-scale template in this book. Make sure that you mark the exact location of the pivot hole as well as the large hole below it.

For the trigger you will need a 3/8-inch-thick steel plate of good quality material so that you can temper it properly after final fitting. When cutting thick metal plates with a hacksaw, use a coarse tooth hacksaw blade of high-speed quality. A fine tooth hacksaw blade will require too much time and effort when cutting thick metal plates.

Once you have traced the full-scale template of the trigger on the metal, grip the plate in a vise and cut individual contours as closely as possible with the hacksaw, and finish to the final shape with a file of appropriate size and shape. It is best to leave excess metal on contact areas to allow for final fitting later on. Now drill the two holes with the specified size drill. Double check to make certain that you have marked their exact location with the center punch before drilling the two holes.

After the holes have been drilled, you must remove the step on the left top portion of the trigger to leave clearance for the left piece of the sear. The easiest way to do this is to cut vertically with a hacksaw starting from the top of the trigger. Cut to the specified width and depth. The end depth of this cut is then met by cutting horizontally on the left side parallel to the depth of the vertical cut. This will remove a long vertical piece of the step. The rough hacksaw cut is then levelled to the specified width and depth, forming the step for sear allowance.

The trigger is then sanded with emery cloth beginning with a coarse grade then gradually moving to finer ones for final polishing. Make sure that the area of trigger contact with the trip is highly polished for best results. It is best to leave excess metal on the front and lower portions of the trigger hook to allow for proper fitting allowance. This area of the trigger must be adjusted gradually during fitting to ensure proper engagement and disengagement with the trip step during trigger pull.

5. The Replacement Safety- Selector Mechanism

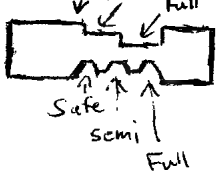
The original factory trigger mechanism incorporates a push-button-type safety which locks the sear into engagement with the hammer when it is cocked. The safety cannot be put on "safe" unless the weapon is cocked and ready to fire. The original push-button safety is only convenient to operate on "fire" position. Although it can easily be reached by the trigger finger, it is difficult to put it on "safe" without using two hands. Furthermore, a push-button-type safety is confusing to operate in an emergency or in the dark.

Fitting a replacement safety mechanism is easier. The replacement safety selector incorporates a wide lever for fire selection that is conveniently controlled by the trigger finger. The wide lever also readily indicates whether the gun is on "safe," "semi," or "full auto." This eliminates any guesswork in operating the gun.

The replacement safety selector has three basic indexes. But there are two configurations for selection, the second of which is preferable. One system is the popular "safe," "semi," and "full auto" arrangement demonstrated in this book. This configuration, however, requires an extremely powerful index spring an a 1/8-inch steel ball to replace the original safety plunger and spring assembly or malfunctions in semiautomatic fire might occur. Using a powerful index spring and a 1/8-inch steel ball, the selector is positively locked in place when the trigger is pulled and the index is set on semiauto. The ejector spring used on the Mini 14 and M1 .30 caliber carbine is ideal as a replacement spring to mate with the 1/8-inch steel ball. Use as many coils as possible for maximum strength when using the substitute spring. To remove the original spring-loaded plunger of the safety, first remove the entire trigger mechanism from the trigger housing frame, including the magazine catch assembly. Leave only the push-button safety in place. Now rotate the push-button safety counterclockwise about 30 degrees until the solid part is parallel with the plunger. With a piece of cloth, cover the trigger plate so that the plunger, which is under spring tension, will not be lost. Push the pin out towards the left.

After disassembling the push-button-type safety, cut about five coils from the heavy spring and ready the steel ball. Assembling the powerful spring unit and steel ball requires a push rod and a slave pin that has no notches and that is chamfered 45 degrees on both ends. The slave pin will be the same diameter and length as the original push-button safety and will serve as a very useful substitute for the safety selector mechanism during assembly and disassembly of the rifle, since the lever-type safety will not permit the action to be lifted out of the stock during the field stripping process.

The push rod can easily be improvised using 1/8-inch diameter mild steel rod. The length is about five inches. One end will be countersunk about 1/16-inch deep using a 1/8-inch diameter drill. The countersunk end will hold the steel



ball steadily on top of the spring while you are pushing it in. First insert the spring inside the index spring hole then insert the steel ball. The end of the spring must be level with the outside surface of the pocket hole so that the steel ball can easily be pushed into the center of the spring using the countersunk end of the push rod. Insert the slave pin while pressing the push rod in. This will force the steel ball level with the pocket hole so that the slave pin will go through the safety pin hole. As soon as the slave pin rides over the steel ball, quickly withdraw the push rod and push the remaining length of the slave pin through the safety hole. The powerful index ball assembly is now secured in place by the slave pin. If the steel ball obstructs the pin from going through, cut one or more coils from the spring until the pin is inserted in place. However, even with this powerful unit in place, the assembly tends to shift forward, especially during full auto or short burst firing, due to vibration. A second option is easier and more positive.

In the second arrangement, the original selector index assembly is used. The fire selection setup, however, is reversed. The configuration is "safe," "full auto," then "semiauto," in the full forward position. In this arrangement, the selector lever must be rotated forward all the way until it stops against the underside of the stock. This will prevent further forward rotation of the selector. Since the lever is then positively locked against the stock, positive semiautomatic functioning is obtained. This arrangement is advisable since it is much easier to accomplish.

For those who do not want to build the safety-lever-type mechanism, another simple but very efficient arrangement is the push-button-type mechanism. This arrangement permits the original push-button-type safety plunger index to be used. The original safety has two indexes for "safe" and "fire." On the top portion is a large, wide notch for sear clearance. A push-button-type selector can easily be built using the original pattern simply by making a push-button-type safety approximately 1/8-inch longer than the original. The added length will provide allowance for an extra index notch for "full auto." The top notch, of course, will have two steps for the type of fire required: the first step will be the shallow one for semiauto fire and the second, deeper step is for full auto.

Before cutting the two steps on top of the pin, make the index notches by referring to the original safety. As noted, for "fire," push the safety to the left. On the reverse, the solid portion of the safety is parallel to the sear nose. Therefore, the additional third notch must be cut on the left of the second notch. With the selector in the middle notch position, there is an extra 1/8-inch protrusion on the right side of the trigger housing frame. Pushing this extra 1/8-inch protrusion will position the selector in the third index for full auto functioning. Once the third index is cut and adjusted, the top steps can be cut. With the selector in the middle position, the shallow notch for semiauto firing must be cut. The deep notch will be for full auto firing. Make sure that these step notches are cut parallel to the lower part of the sear making contact with the safety. *Do not cut* any step on the pin parallel to the lower part of the sear when the selector is in "safe" position (when the push-button-type selector is pushed all the way to the right). This arrangement is easily adaptable for left and right handed shooters by simply reversing the step notches.

Note that the push-button-type safety is oversized in length and will therefore need a slave pin the same length as the original safety. This is necessary for assembling and disassembling the rifle. The original safety can be used as a slave pin by simply rotating it counterclockwise 30 degrees until its solid portion is parallel to the index plunger. The safety pin can then easily be pushed out by the substitute selector pin.

6. The Simplified Conversion Housing

As designed, the conversion system requires absolutely no modification to the trigger housing frame or the receiver body. For this reason, a simple and efficient substitute trigger component was incorporated for the new, open-bolt firing system and selective-fire capability. To accomplish this task so that the original component is interchangeable with the new conversion parts, a "drop-in" converter mechanism was employed. The converter mechanism requires a separate housing which can be simply constructed from an elementary male and female die.

The material required for the converter housing is 1/16-inch-thick sheet metal. Mild steel or aluminum materials are preferred as they are easily bent compared to high tensile materials. The material is cut to the specified preforming size, then it is positioned between the male and female die. The die is then gripped in the vise and tightened. The sheet metal is formed as the male die is forced into the female die pocket. The converter housing is then removed from the die and the cardboard template is traced on its side. It is best to apply metal ink or mark the surface of the formed housing with large, permanent black marker before tracing the cardboard template so that the lines are more visible. In marking the centers of the pivot holes, reinsert the male die inside the housing so that when you center punch the hole locations, the housing will not be deformed.

To find the precise location for mounting the converter housing assembly to the factory trigger housing frame, first cut the converter housing with a hacksaw and finish it to its final shape with a flat file. Insert the housing inside the factory frame shaping it until it is properly contoured to fit the factory housing frame.

Once the fitting and shaping is completed, insert the converter housing back into the factory frame housing and mark the location for the trigger and ejector pins. Using a 1/8-inch diameter bit, mark the trigger and the ejector pin holes. Begin drilling with a 1/16-inch diameter bit to make a starter hole before drilling with the larger bit. You can drill through both walls if the part is properly secured to prevent misalignment. Otherwise drill the holes one at a time. The remaining two holes for the trigger and sear pivot pins can then be marked and drilled. The trigger notch clearance can also be cut along with the other rectangular-shaped slot underneath the converter housing for the sear lower portion insertion.

The converter housing is now ready for the trigger component fitting.

7. Assembling the Selective-Fire Conversion Unit

To assemble the converter mechanism in proper order, follow these simple steps, being careful to complete each step before moving to the next.

1. Assemble the tripper and its spring into the sear pocket, inserting the spring first into the squared surface inside the pocket of the middle piece of sear. Next insert the trip with its lower squared portion securing the other end of the spring. Note that the trip requires a powerful spring for positive engagement with the trigger hook. A weak trip spring will cause early disengagement of the trigger, and the sear will not be depressed far enough to release the bolt forward to fire the gun. Press the trip in under heavy spring tension until its pivot hole is in line with its assembly hole in the sear. Insert the small pin once the holes are aligned. This will hold the trip in place.

2. Insert the trigger/sear spring into its guide rod. Note that this spring is powerful and longer than the guide rod itself. Care must be taken during assembly of this part to prevent injury. Next align the end of the spring and guide rod to the oblong slot of the sear (left piece bent area) and push in carefully with your right thumb against the head of the spring guide while the rest of your finger controls the sear. Push until the end of the rod protrudes outside the oblong slot. Now insert the trigger into its oblong slot on the front end just below the hook until the small hole at the end of the spring guide is visible inside the large hole of the trigger. With a long-nose plier, pick up the small retaining pin and carefully insert it into the small hole of the guide rod inside the large hole of the trigger. Hold the inserted pin in its center position so it won't fall off, then slowly ease your grip on the spring tension. This will automatically secure the spring unit in place. Note that the small retaining pin that is inserted at the end of the guide rod is slightly bent in the middle to prevent it from coming off. The bent part must be facing forward to lock it in place. To disassemble the spring unit, simply push on the spring guide head while restraining the sear until the retaining pin drops off from its seat on the end of the guide rod.

Note: Make sure that the hook of the trigger is riding over the trip mating step during the insertion of the trigger to the spring guide rod.

3. The sear/trigger unit is now retained as one subgroup. The next step is to place the preassembled trigger group inside the converter housing. The lower part of the sear that will be making contact with the selector is inserted first and aligned with its mating slot underneath the housing so that the sear can easily be pushed into place. After the sear foot protrudes under the rectangular slot and trigger lower portion is positioned below the housing, align the sear pivot hole and insert its pin. After the sear pin is in, push in and down at the top portion of the back of the sear and align

the center of its slot to the trigger hole. Then align the trigger pivot hole to the slot of sear, and insert the pin.

4. The last step is to assemble the converter unit inside the factory trigger housing frame. To do this all original trigger components must first be disassembled with the exception of the magazine catch assembly. The converter unit easily slides into place, where it is secured by the original trigger and ejector pins. Make sure that the ejector is in place when you insert the ejector pin. The new selective-fire mechanism is now in place and ready for action.

Note: Make sure that your slave pin is inserted into the trigger housing plate before assembling the gun to the stock so that the rifle body can be inserted freely in the usual order. The selector mechanism is inserted after the stock screw on the underside of the stock is tightened.

8. Machinist's Drawings and Templates

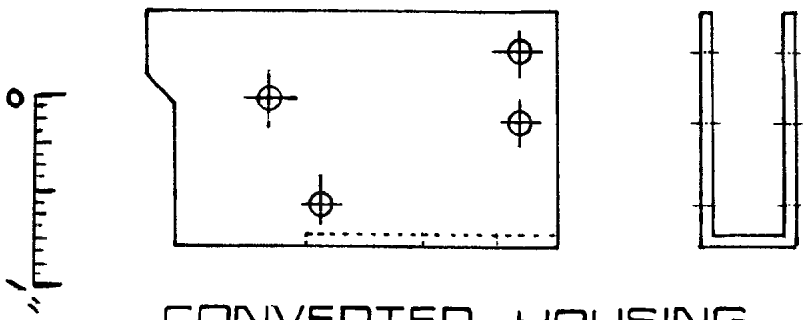
IMPORTANT PREPARATIONS PRIOR TO BUILDING CONVERSION PARTS

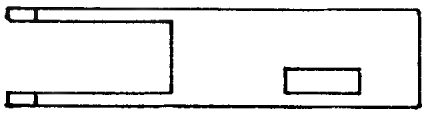
For the benefit of those who do not have precision measuring tools, full-scale templates are included. In order to make accurate copies of the conversion parts, it is necessary to prepare a cardboard template by tracing the full-scale drawing in the book using carbon paper. This technique is advisable in building the 1022 conversion unit components. Since most of the basic parts are made of sheet metal and plates, these are very easily built by hand using common tools such as a hacksaw, a set of files, a portable electric drill or a hand drill, if you can drill a straight line with one. A vise is the most important tool, to hold the metal while you work on it. Several grades of emery cloth and other polishing compounds will be helpful, especially when polishing contact areas for smooth operation.

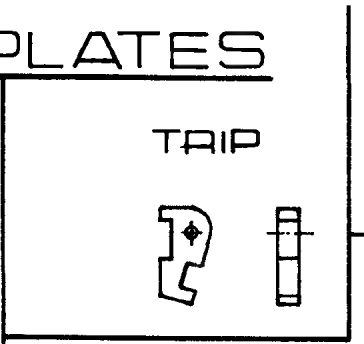
Some portions of the conversion parts are drawn slightly larger than the fitted prototype parts, particularly in contact areas, to allow for a proper fitting allowance during final assembly. It is better to have an oversized part during construction, which can be adjusted to a proper fit, rather than an undersized part which may not function at all after assembly. Oversized portions that may or may not need some adjustment during final fitting are noted on the drawings of each part. The builder must see to it, however, that gradual adjustment of these parts is carefully performed to avoid excessive trimming which may cause a part to become undersize and not fit properly.

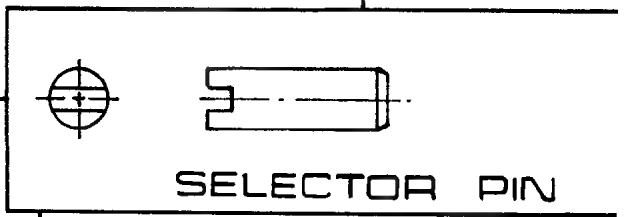
Remember that the key to a successful project is patience and careful fitting of all parts. This is a one-of-a-kind weapon that needs to be fine tuned to functional order before being fired with live ammo. All critical parts, particularly portions that are subject to wear, such as the contact areas, must be tempered properly then polished smooth for trouble-free operation after all components are fitted in working order. Always wear eye and hearing protection whenever you are shooting a gun. Observe all safety precautions to avoid injury to yourself and anyone around you.

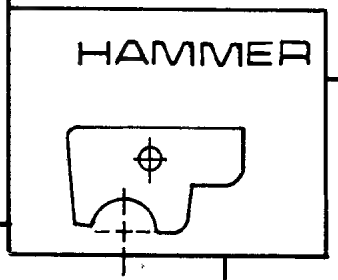
FULL SCALE TEMPLATES

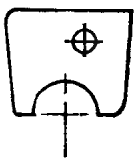


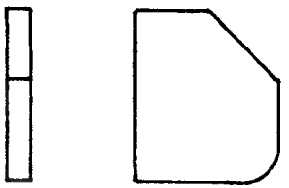


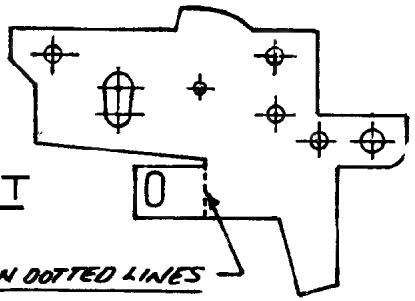


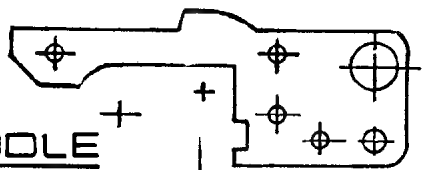


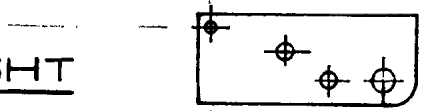


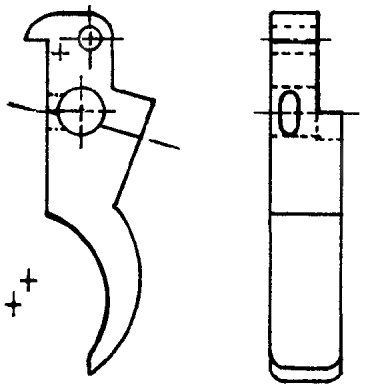


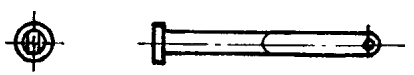


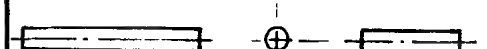












ASSEMBLY OF CONVERTER MECHANISM WITHOUT HOUSING TO FACTORY TRIGGER HOUSING PLATE

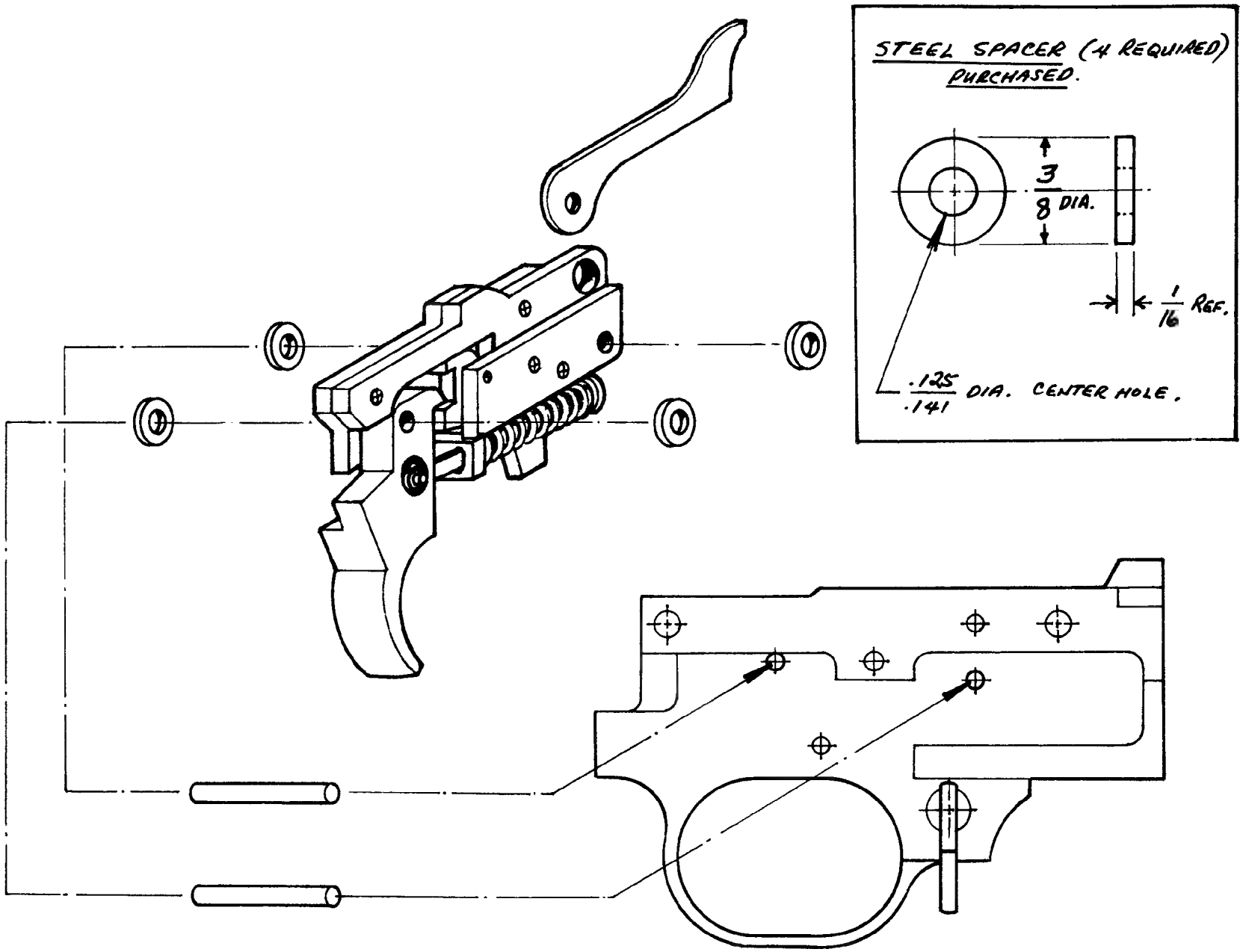
For the benefit of those who do not want to build a separate housing for the converter mechanism, the pre-assembled converter can be readily installed in the factory housing frame. To do this, two new 1/8-inch diameter holes for the trigger and sear pivot pins must be drilled in the factory trigger housing plate. The hole for the sear pin is positioned below the ejector pivot hole, and the hole for the new trigger pin is drilled behind the factory hammer pivot pin hole. (See drawing specification for the exact location.)

Since the converter mechanism will be assembled without its housing, there will be a 1/16-inch gap on both sides of the mechanism. A 1/16-inch thick x 3/8-inch diameter steel spacer must be installed on both sides of the trigger and sear pin locations. These spacers must have 1/8-inch or slightly larger center holes for the sear and trigger pivot pins. These spacers are readily available at hardware stores.

In this arrangement, the length of the sear and trigger pins must be the same length and diameter as the factory trigger pin (1/8-inch diameter x 15/16-inch long). The sear and trigger pivot pins of the converter mechanism are to be installed in the factory trigger housing frame; the length of these pins must correspond to the width of the factory housing.

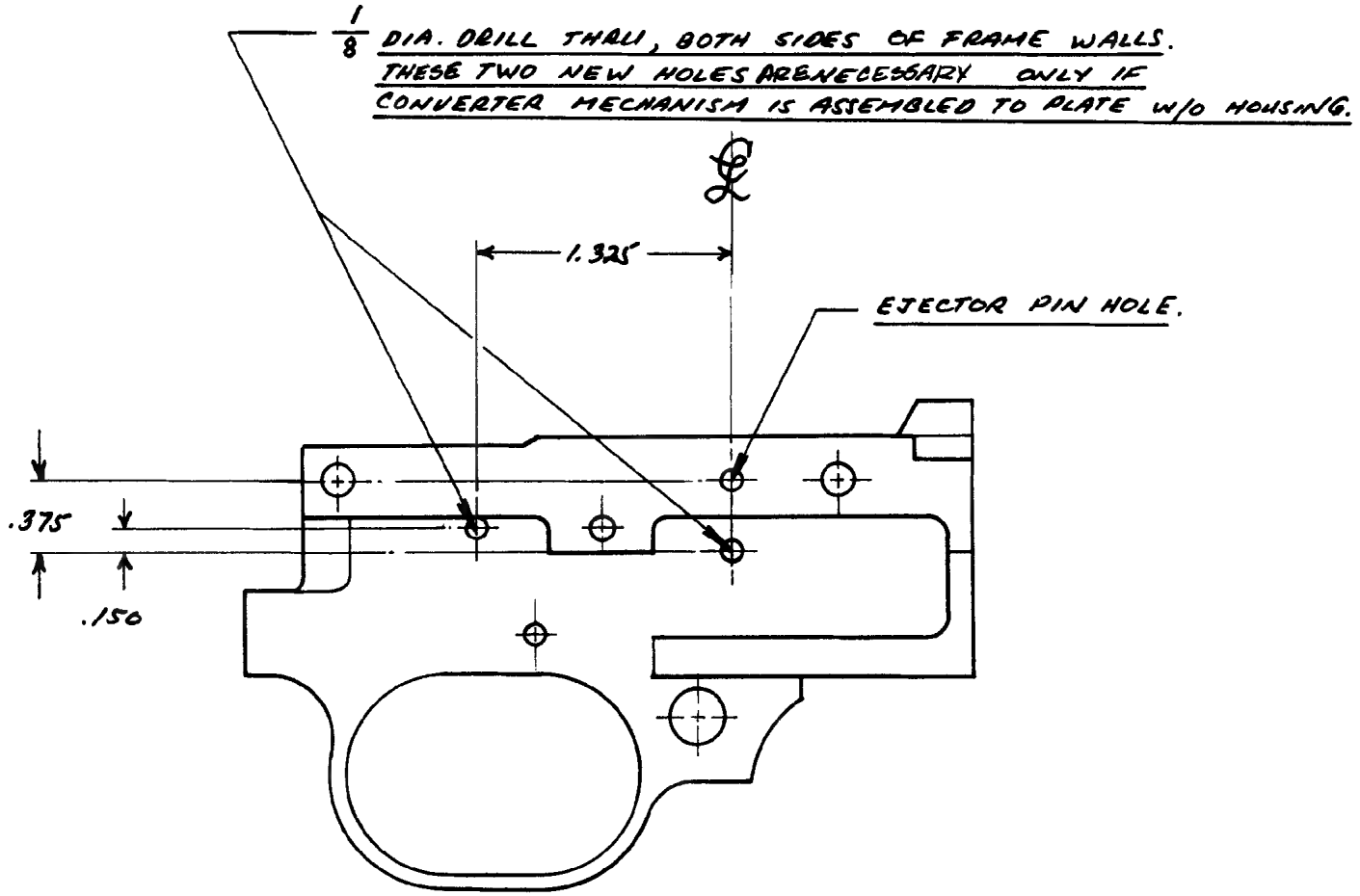
During installation of the converter mechanism using spacers, note any tightness caused by excessive thickness of the spacers; file the surface of the spacers until the tightness is eliminated, then finish the filed surface with fine emery cloth. Filing the spacers to eliminate tightness or rubbing must be done gradually. This is necessary to prevent unnecessary shifting of the sear or trigger on either side of the frame during operation caused by excessive looseness from too thin spacers.

Make sure to polish smooth all contact areas including the portions of the trigger and sear that make contact with the spacers to ensure trouble-free operation. Polishing is best done on the converter mechanism after final fitting and tempering.

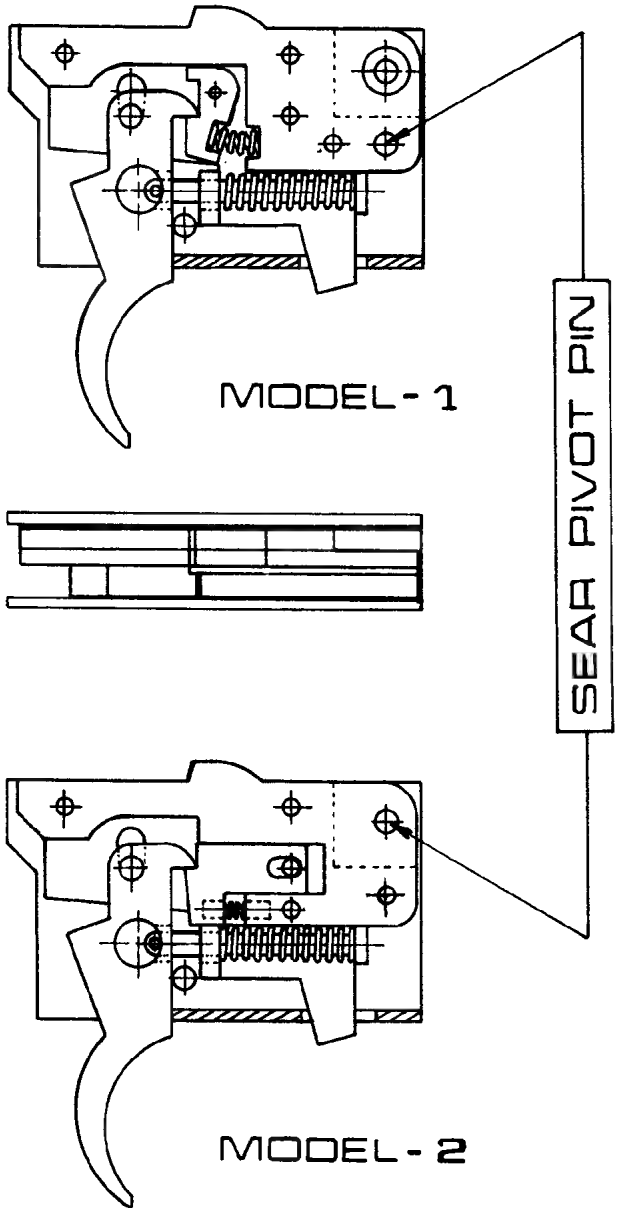


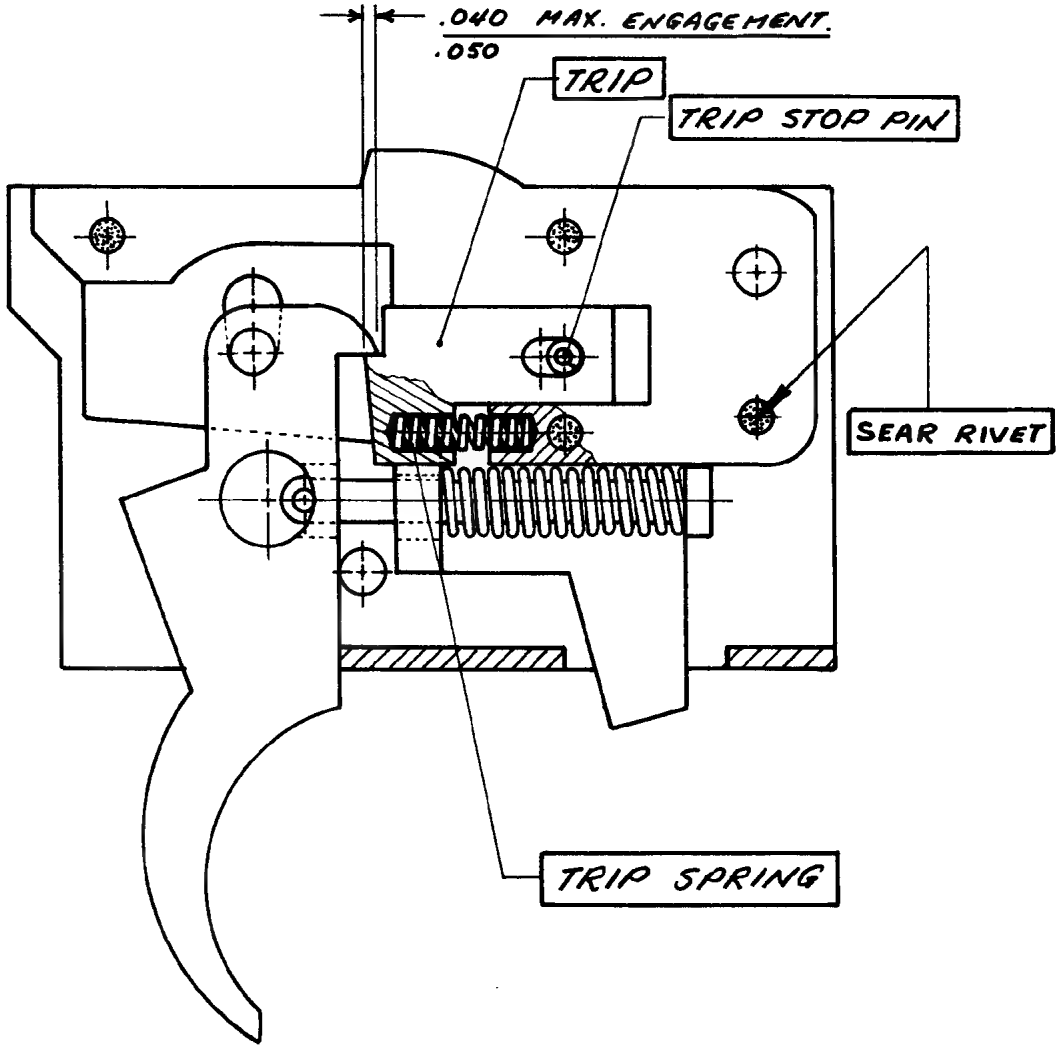
Direct Assembly: Converter Mechanism To Factory Housing

LOCATING SEAR AND TRIGGER PIN HOLES TO FACTORY HOUSING PLATE.



FULL SCALE CONVERTERS



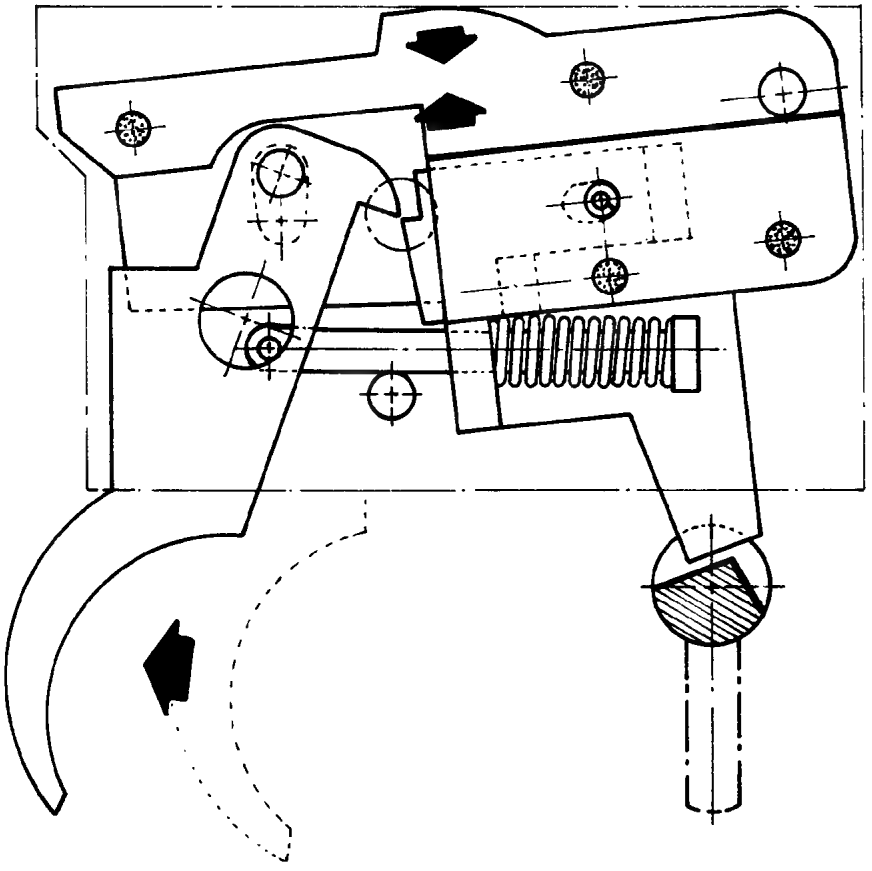


DETAIL-CONVERTER MODEL 2

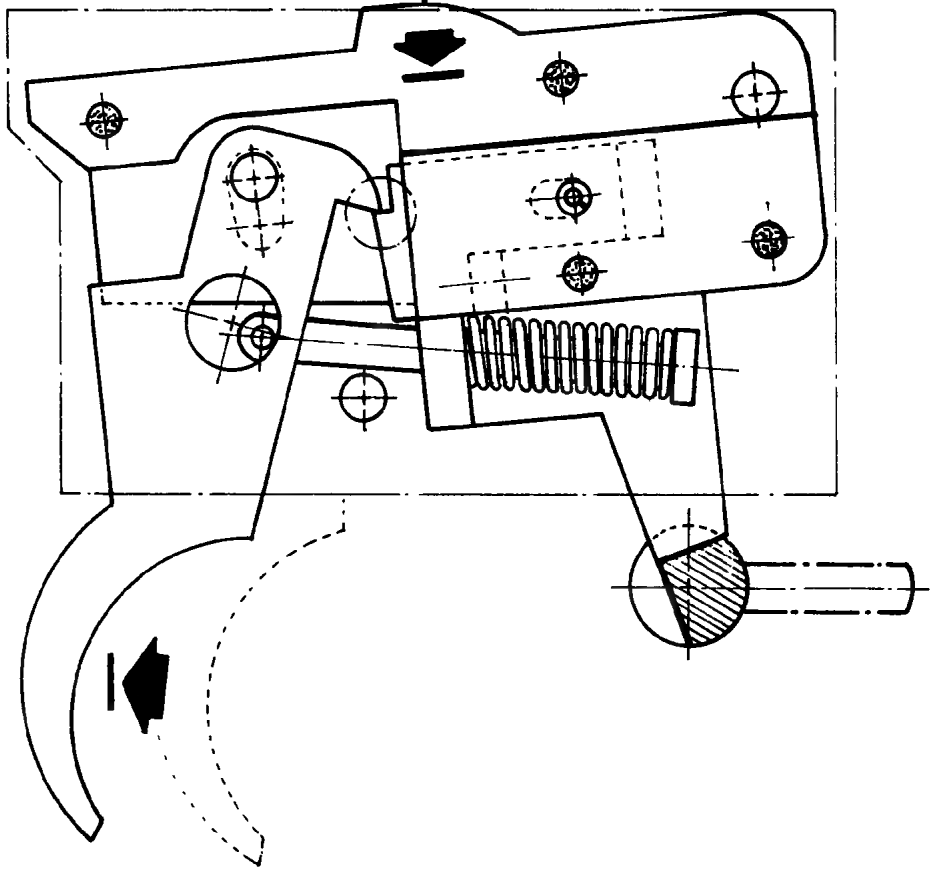
SCALE: 2X

MODEL-2 CONVERTER ACTION SEQUENCE

REMOVE ANY EXCESS PROTRUSION ON THIS PART OF SEAR HUMP AND LEVEL IT ON TOP OF CONVERTER HOUSING.

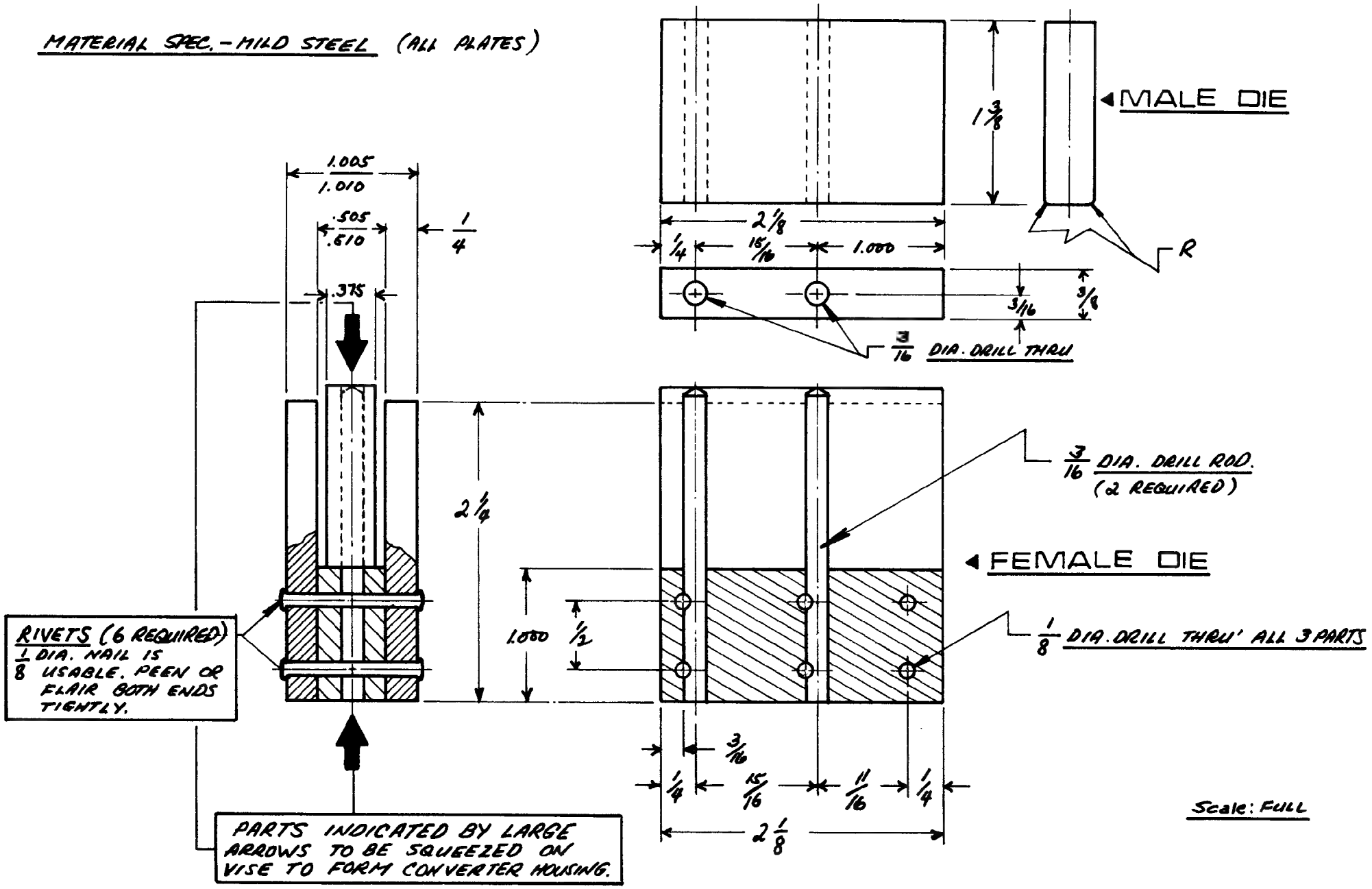


SEMI AUTO.



FULL AUTO.

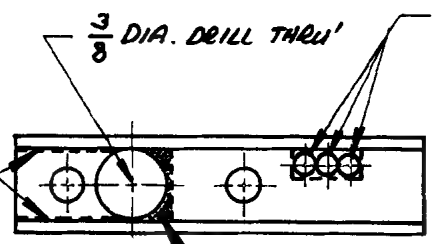
SCALE: 2X

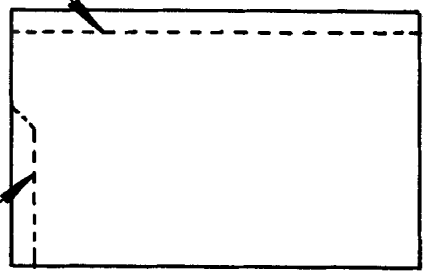


CONVERTER HOUSING MANUFACTURING DIE

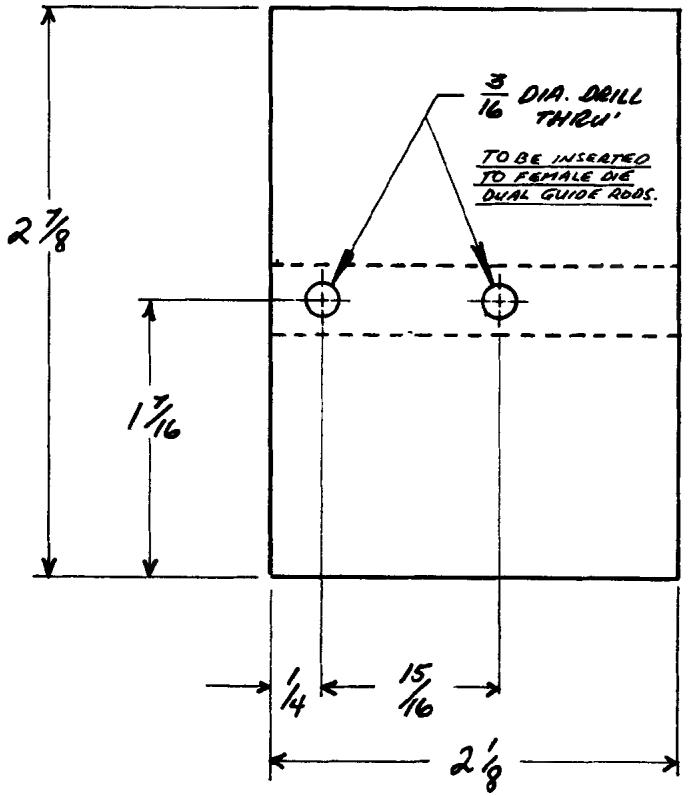
AFTER FORMING

DOTTED AREAS TO BE CUT BY HACKSAW THEN FINISHED BY LARGE MILL FILE.





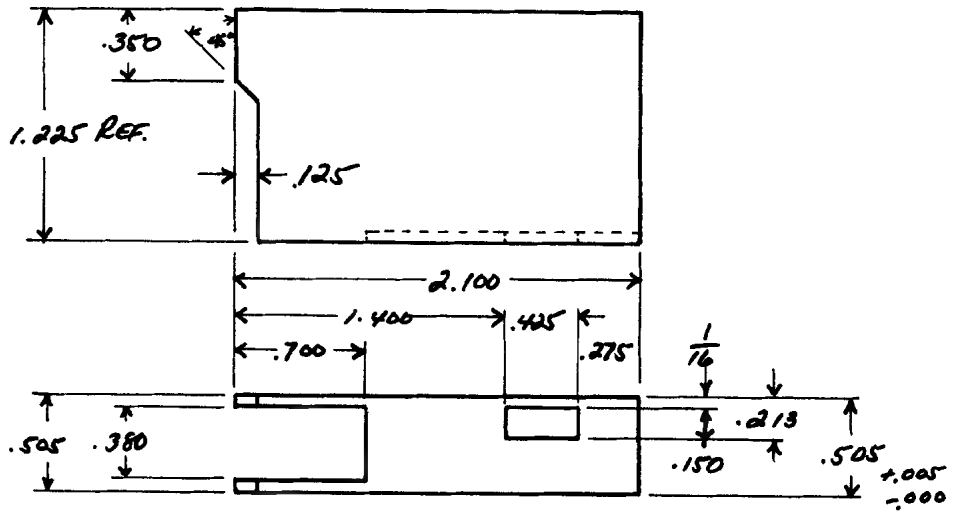
① BEFORE FORMING



MATERIAL: 1/16 THICK SHEET METAL. (MILD STEEL OR ALUMINUM)

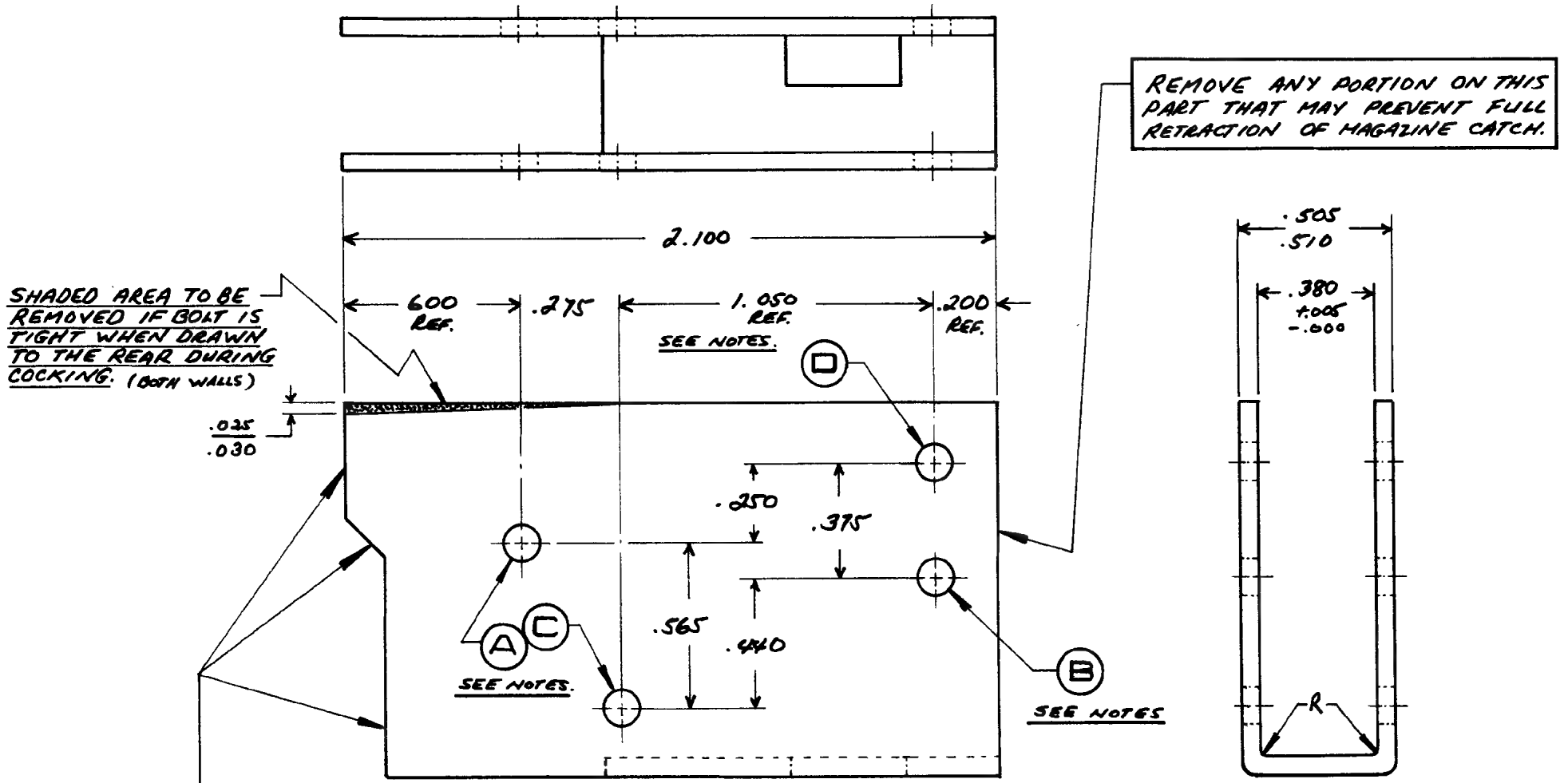
② ALL DRAWINGS ARE FULL SCALE.

③ FINAL CONFIGURATION



CONVERTER HOUSING MFG.

CONVERTER HOUSING FINAL FITTING GUIDE

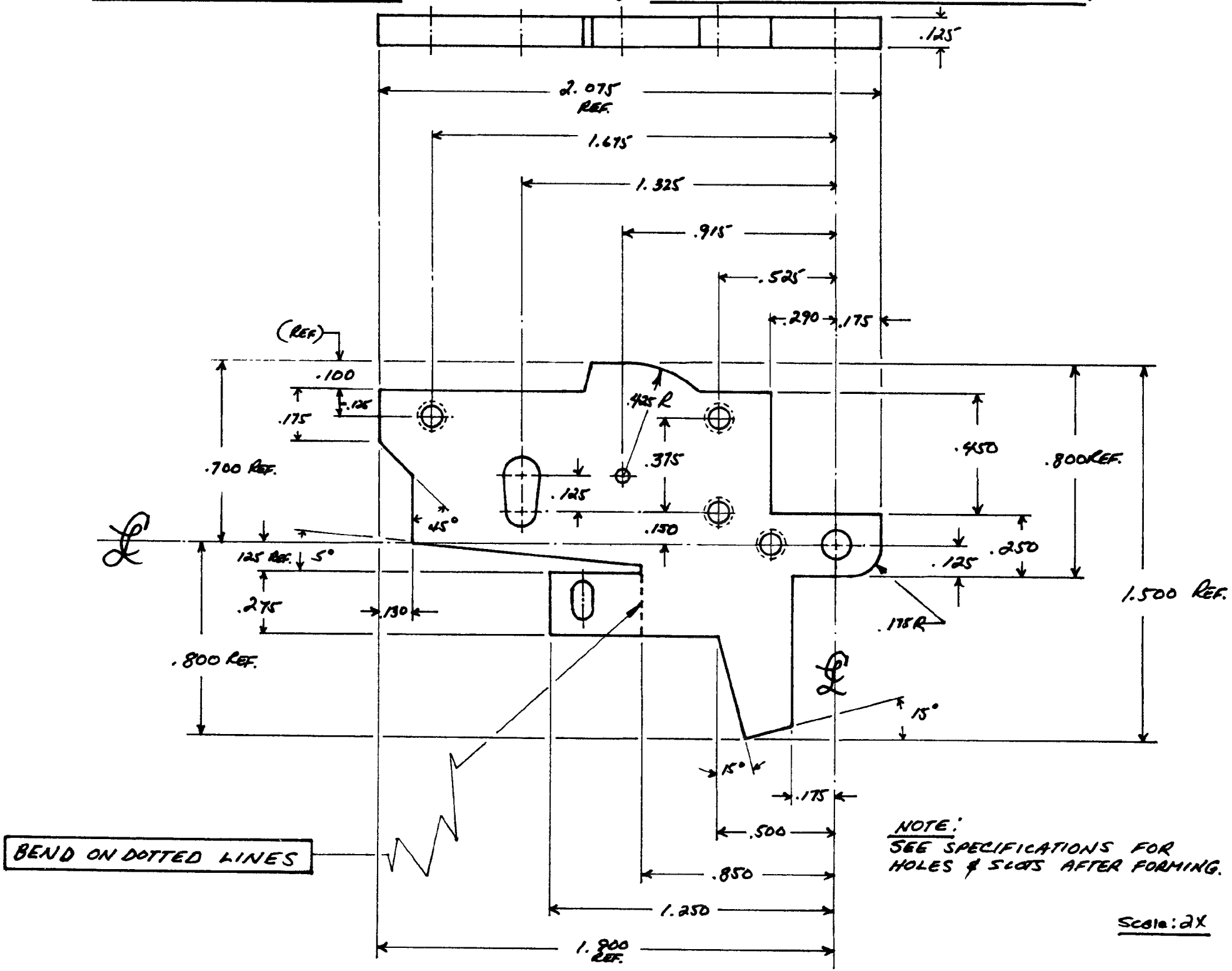


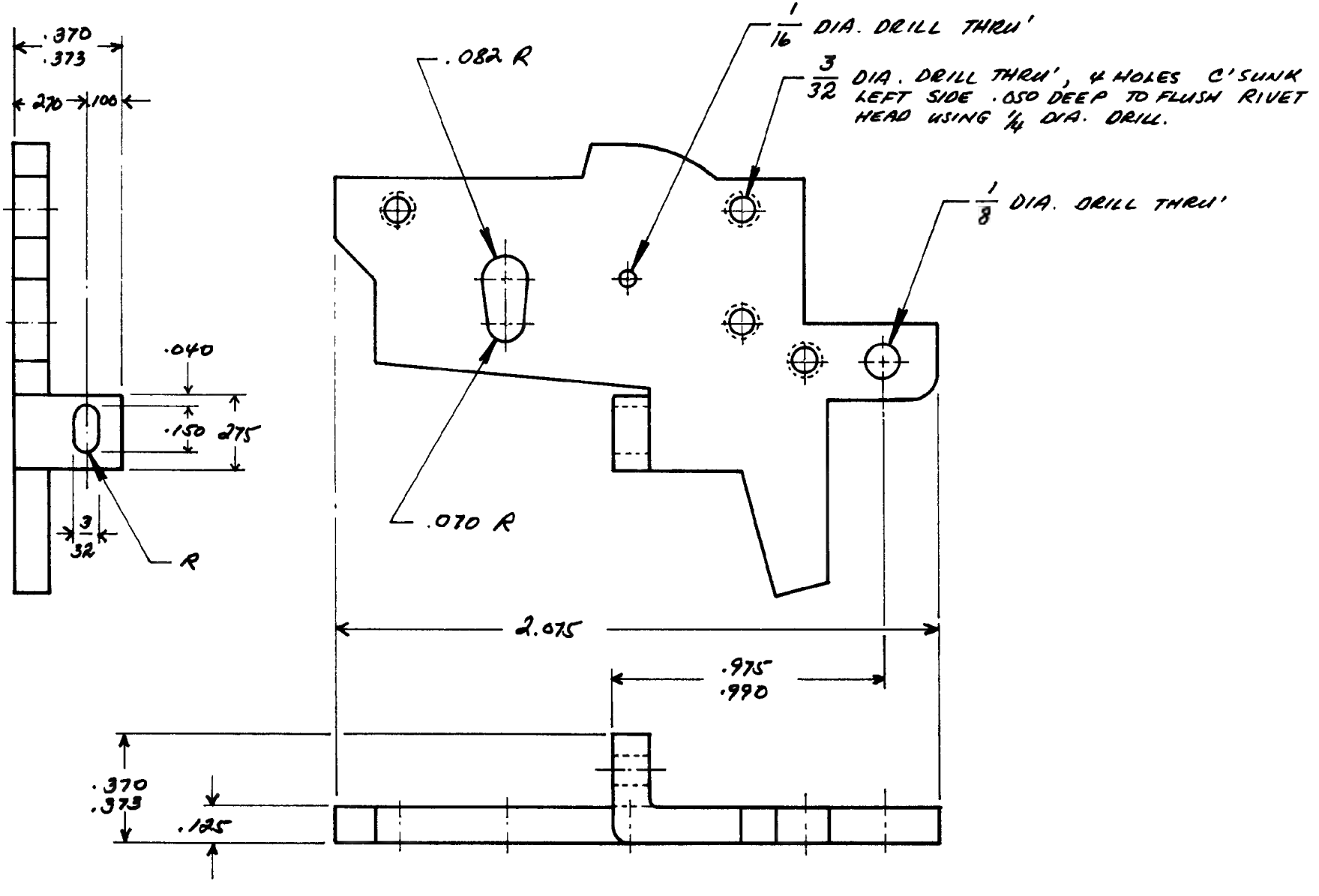
SCALE : 2X

NOTES:

1. ALL FOUR HOLES (A, B, C, & D) ARE 1/8 DIA. DRILL THRU' BOTH WALLS.
2. HOLES C & D ARE BEST TO HAVE THEIR RESPECTIVE CENTER AXIS LOCATED BY INSERTING THE CONVERTER HOUSING INSIDE THE FACTORY TRIGGER HOUSING IN ITS NORMAL ASSEMBLED MANNER.
3. ONCE ASSEMBLED TO FACTORY HOUSING, MARK THE LOCATIONS OF HOLES C & D BY SIMPLY INSERTING A 1/8 DIA. POINTED DRILL ROD OR DRILL BIT THRU' THE EJECTOR PIN HOLE & TRIGGER HOLE. (BOTH SIDES)
4. LOCATE & DRILL HOLES A & B AFTER C & D HOLES ARE DRILLED USING HOLE "D" AS BASE LINE.
5. DE BURR ALL EXTERNAL SURFACES OF 4 HOLES USING 1/4 DIA. DRILL.

DETAIL SEAR (LEFT PIECE) BEFORE FORMING.

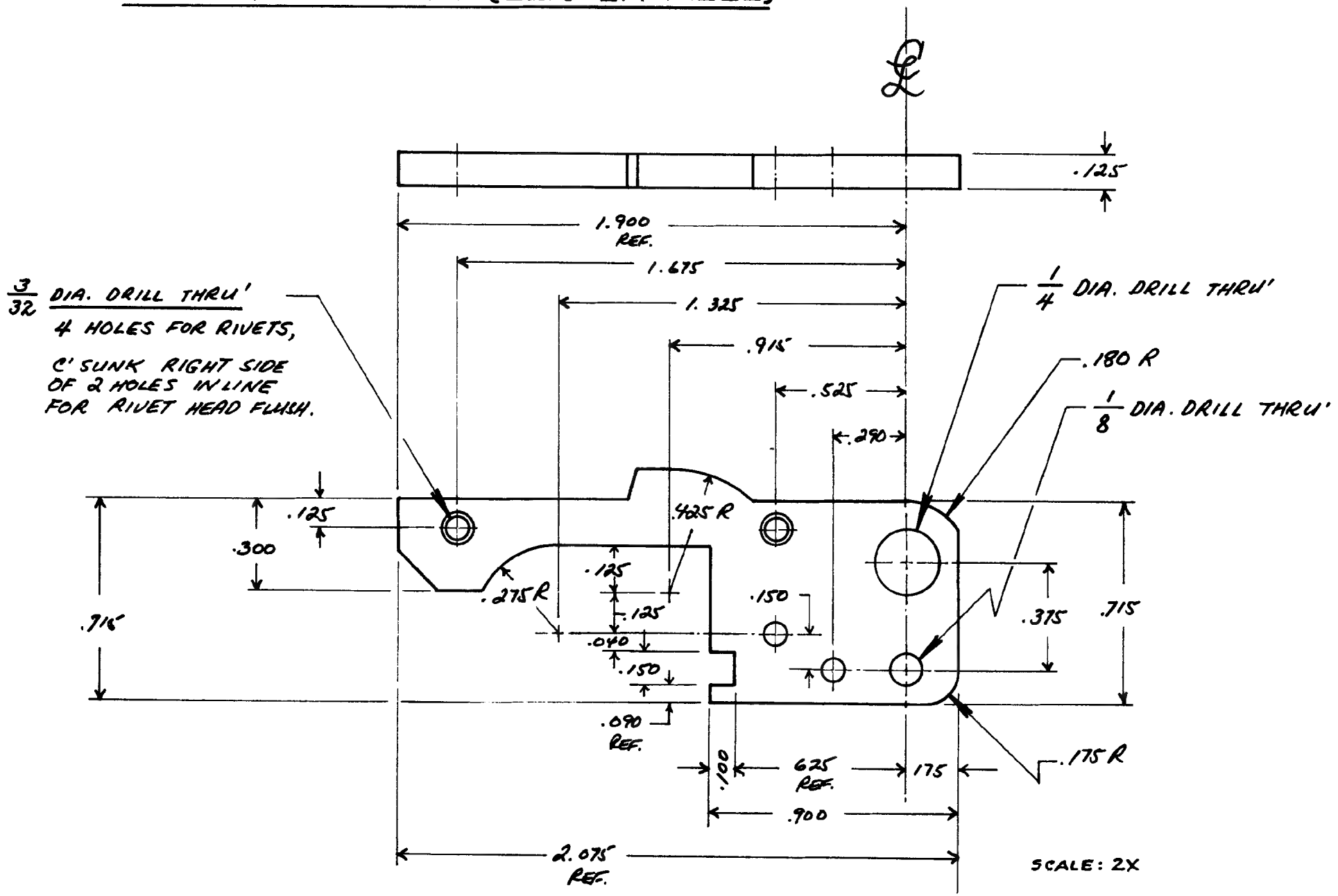




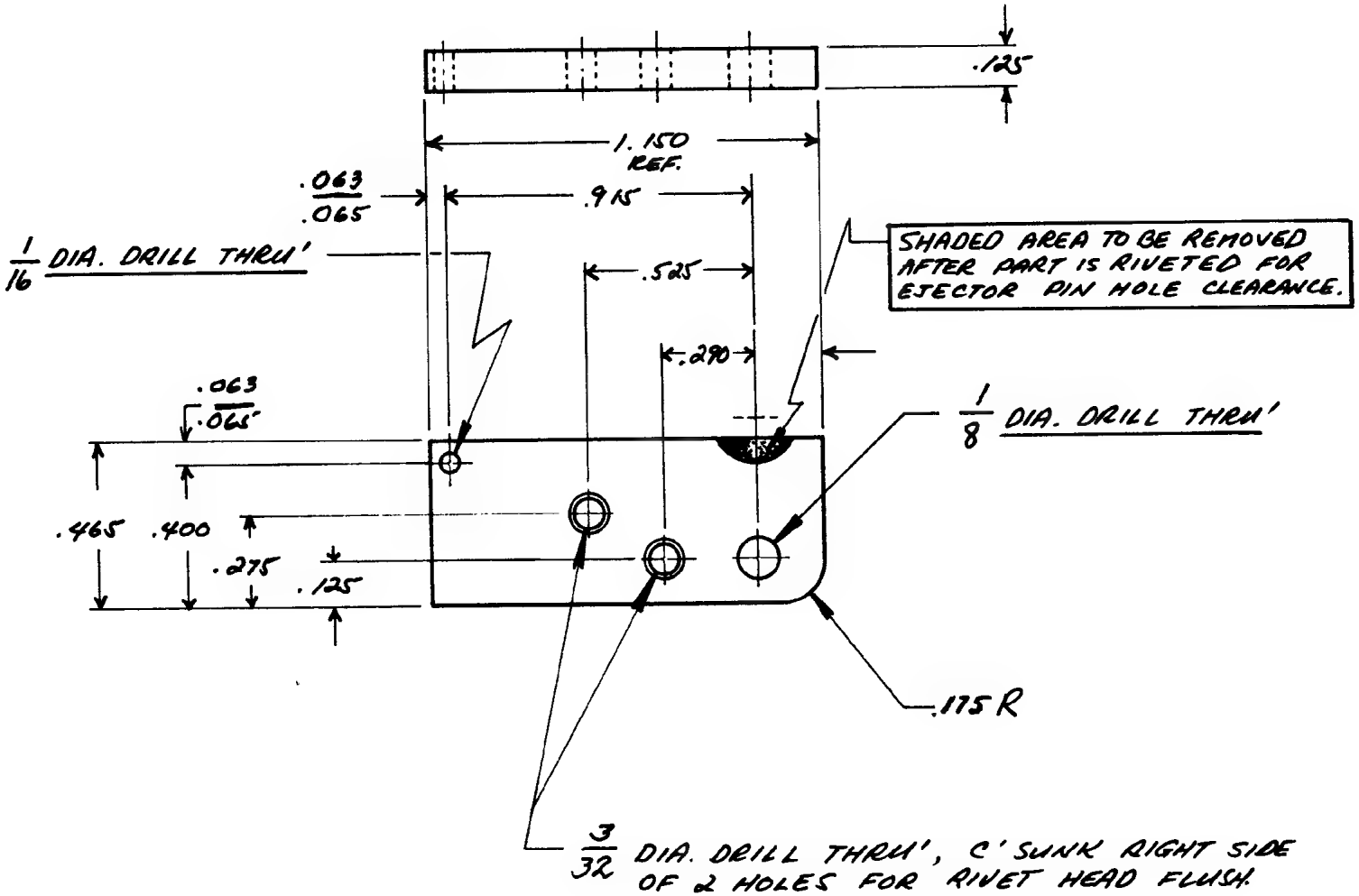
DETAIL-SEAR (LEFT PIECE) AFTER FORMING.

SCALE: 2X

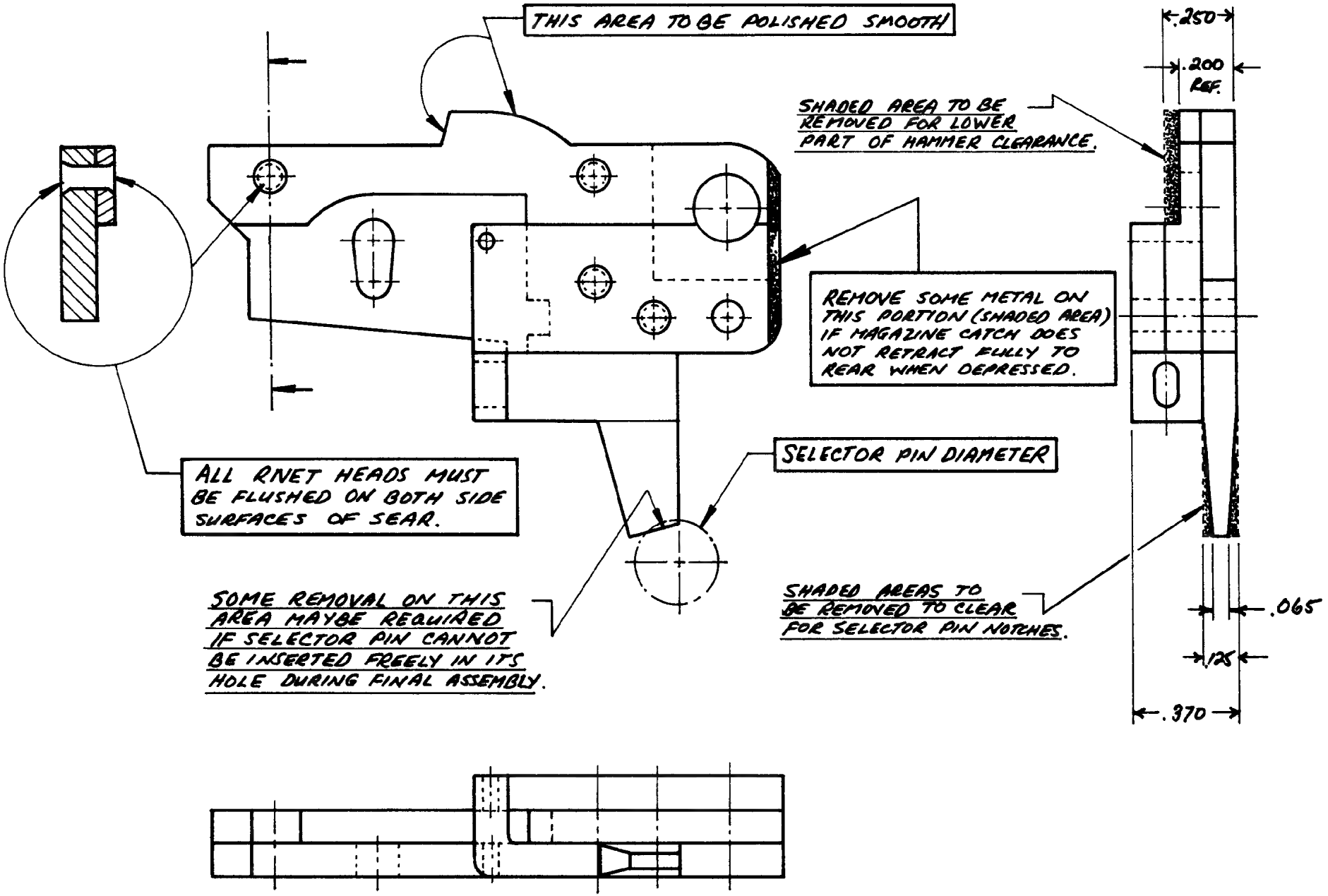
DETAIL - SEAR (CENTER PIECE)



DETAIL-SEAR (RIGHT PIECE)

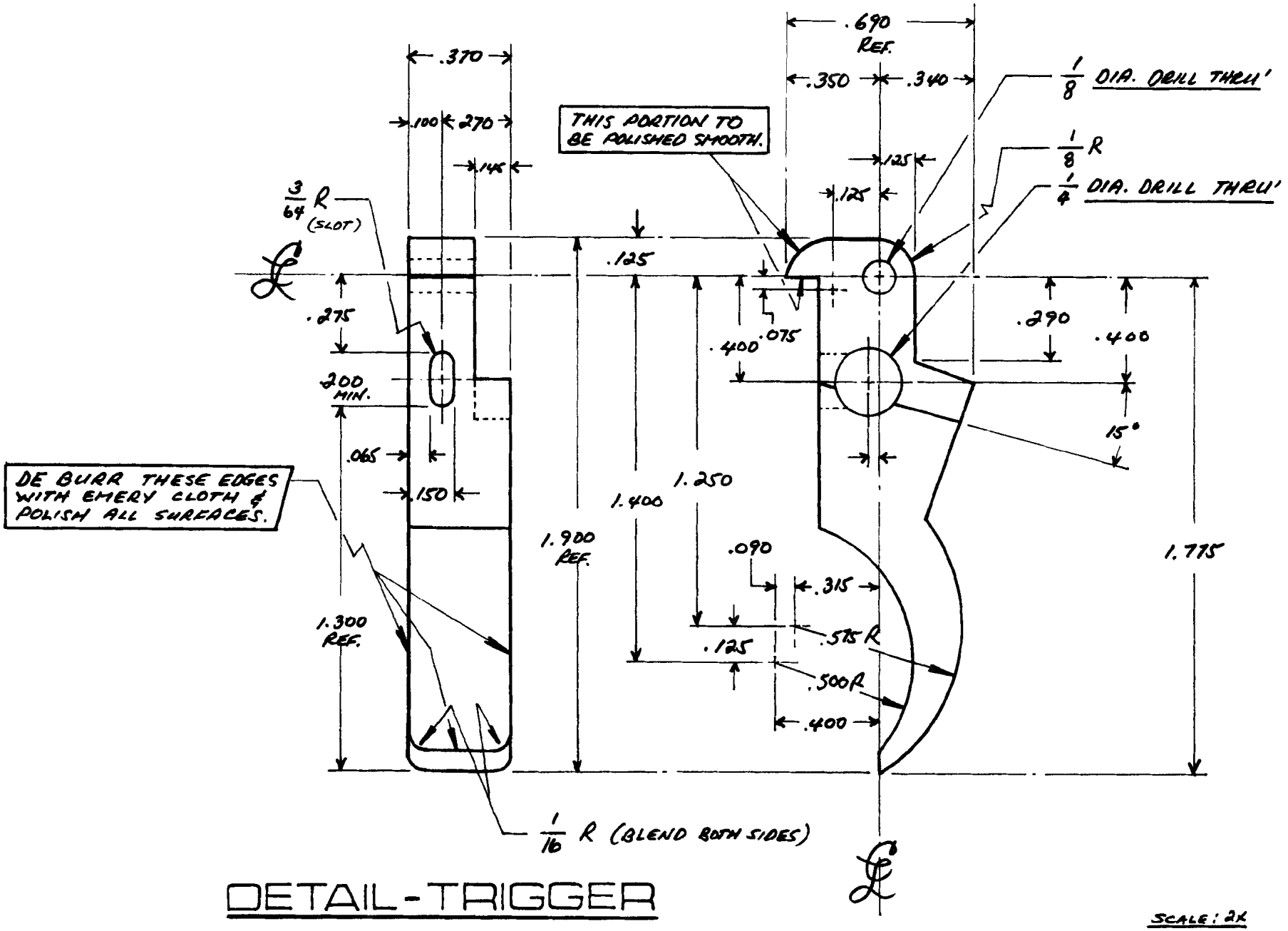


SCALE: 2X



DETAIL-SEAR AFTER RIVETING AND FITTING

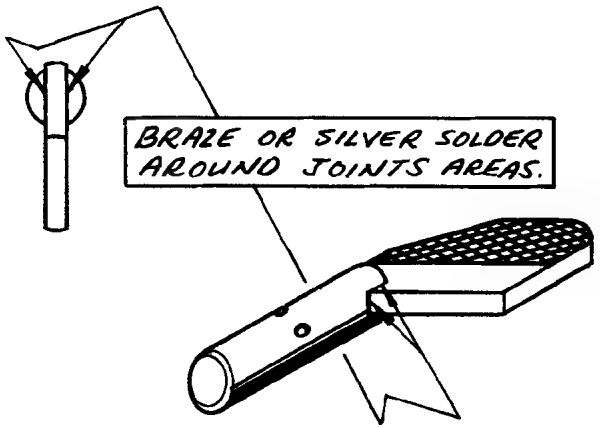
SCALE: 2X



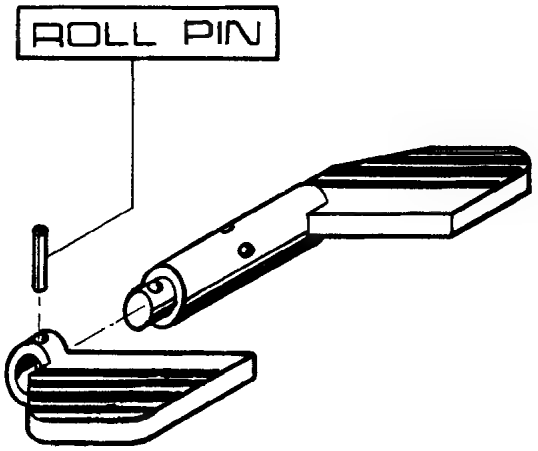
DETAIL-TRIGGER

SCALE: 2X

Selector Variations

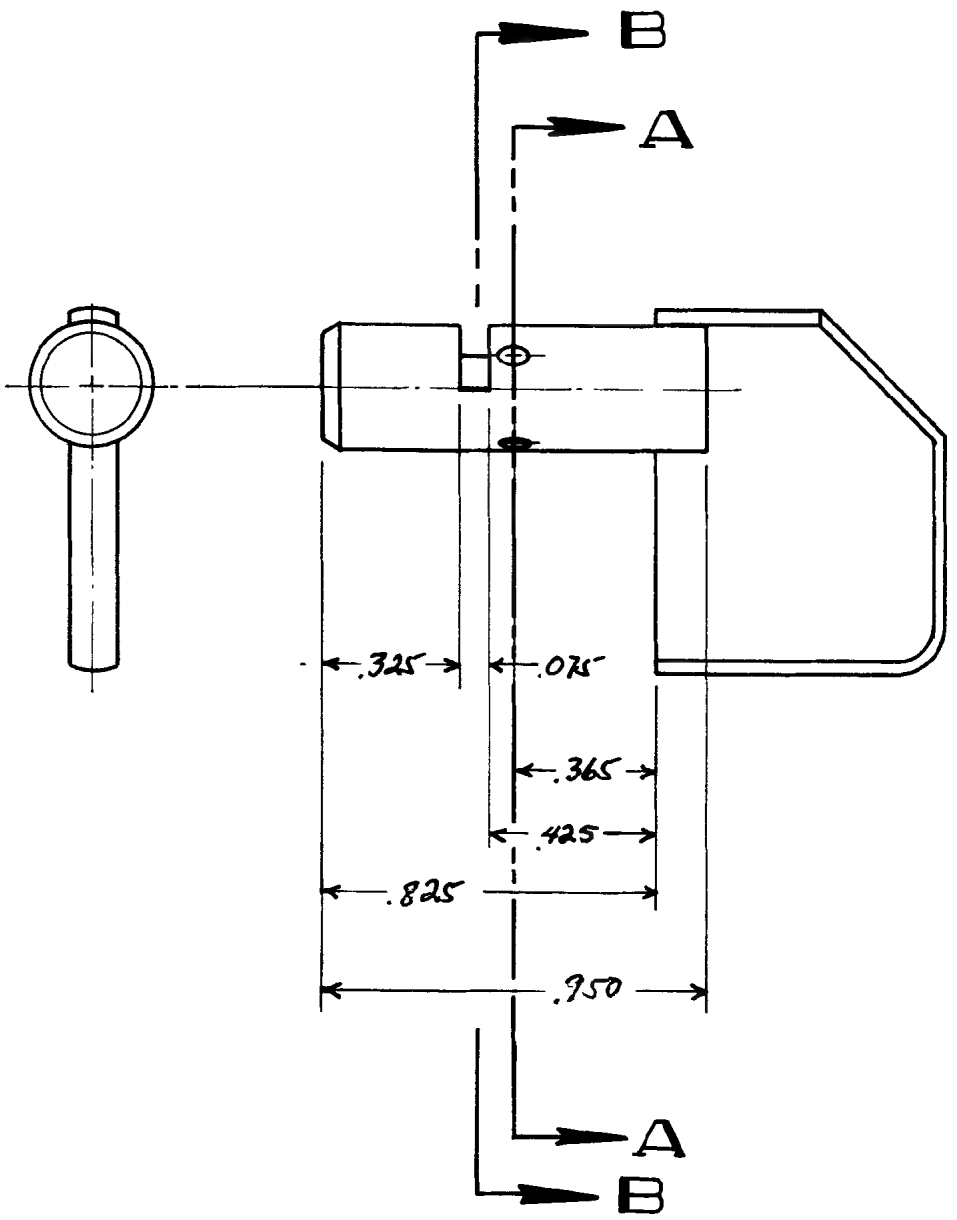


RIGHT HAND

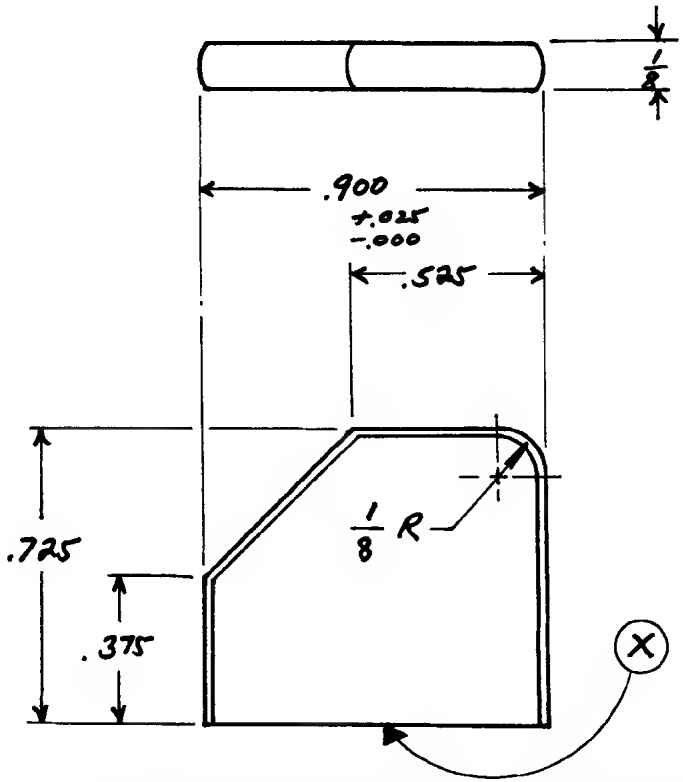


AMBIDEXTROUS

Detail-Selector Lever & Pin Assbly.



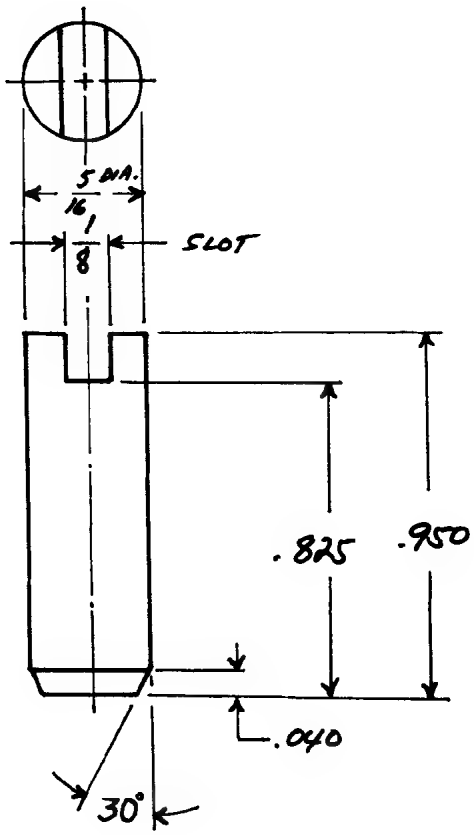
SCALE: 2X



NOTE: ROUND OR BEVEL ALL EDGES EXCEPT BOTTOM PART (X) AND POLISH ALL SURFACES WITH EMERY CLOTH.

DETAIL: SELECTOR LEVER

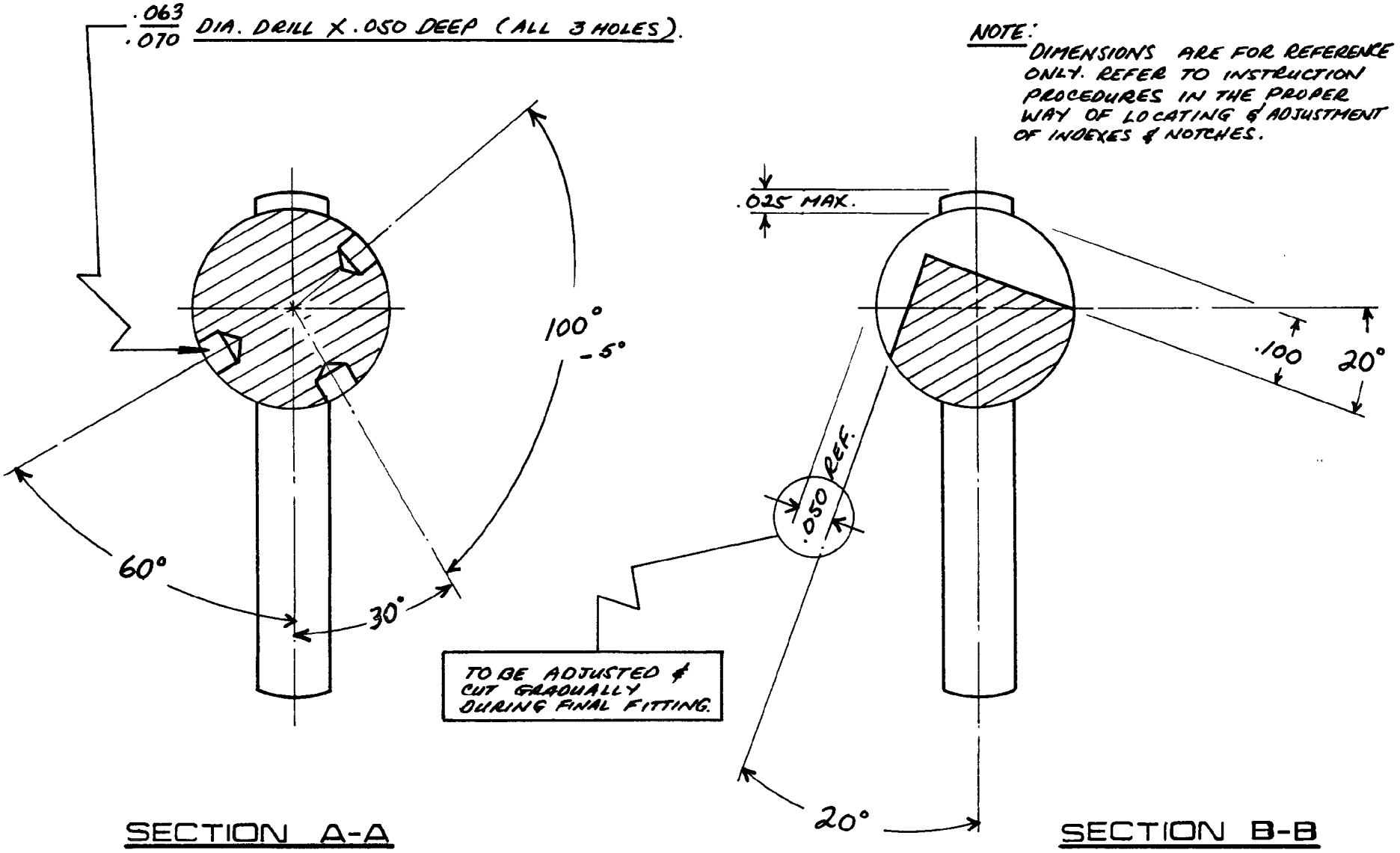
Scale: 2X



SELECTOR LEVER PIN

Scale: 2X

DETAIL - SELECTOR INDEXES AND NOTCHES

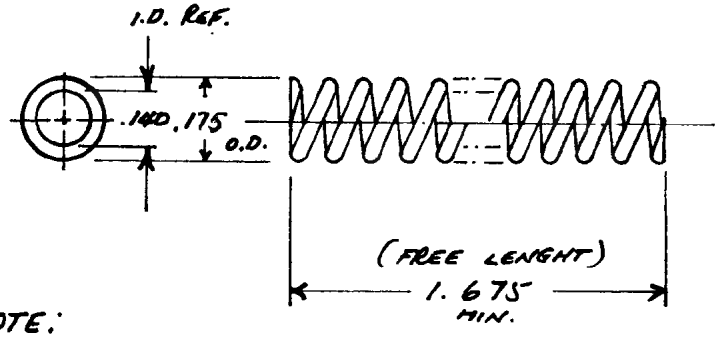


SCALE: 4X

SCALE: 2X

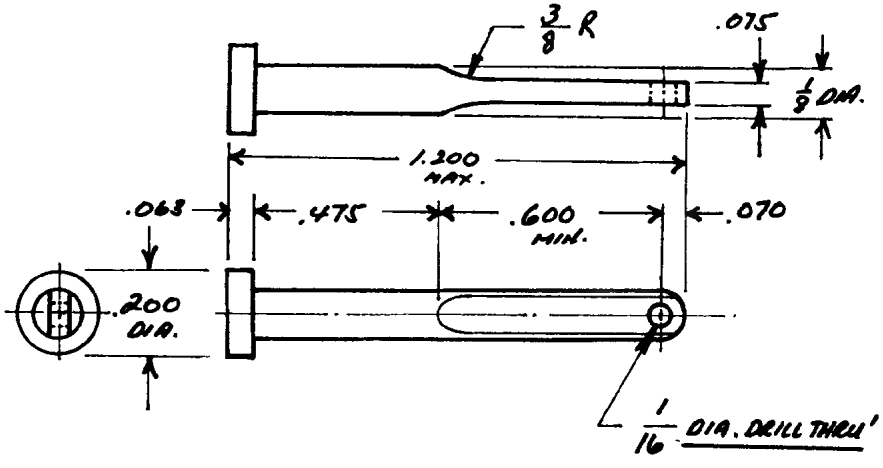
WIRE DIA. IS .030 MAX NUMBER OF COILS 18 20. SAME WIRE CAN BE USED FOR SUBSTITUTE RECOIL SPRING.

SEAR \TRIGGER SPRING



NOTE:
READY-MADE SPRING CAN BE IMPROVISED BY CUTTING 22 COILS (MINIMUM) FROM 1022 RIFLE RECOIL SPRING. ORDER A SPARE FROM FACTORY.

Scale: 2X

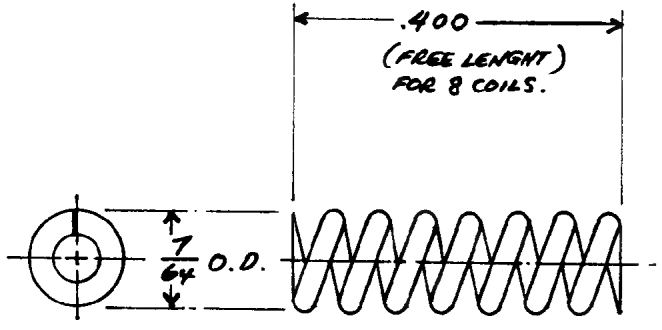


SEAR \TRIGGER SPRING GUIDE

NOTE: THIS PART CAN BE EASILY BUILT FROM 1/8 DIA. X 1 1/2 LONG NAIL.

SCALE: 4X

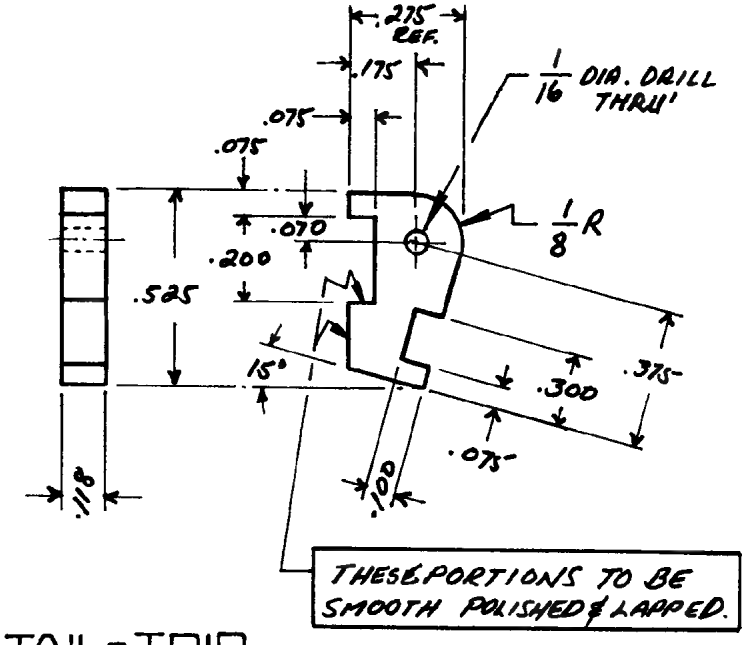
WIRE DIA. IS .025 - .030 MAX. MIN. NUMBER OF COILS IS 6.



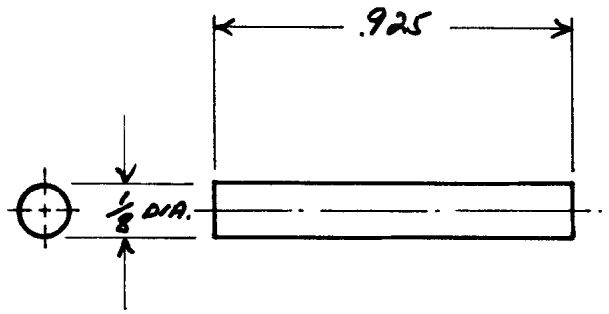
TRIP SPRING

NOTE:
READY-MADE SPRING CAN BE IMPROVISED BY CUTTING SPEC. NUMBER OF COILS FROM MI.30 CARBINE OR MINI-14 EJECTOR SPRING. MAX. O.D. OF SPRING IS 1/8.

SCALE: 2X



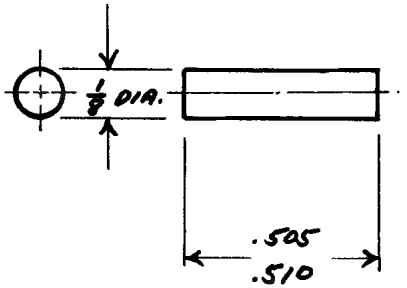
DETAIL-TRIP



Scale: 2X

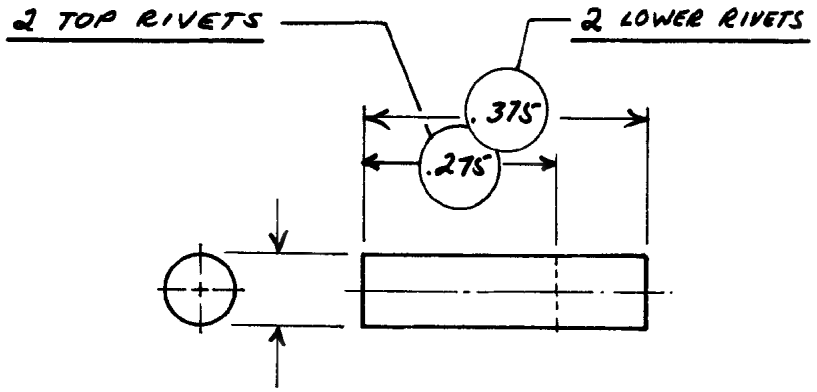
HAMMER PIN

NOTE:
ALL PINS MUST HAVE SHARP EDGES ON BOTH ENDS DE BURRED WITH EMERY CLOTH.



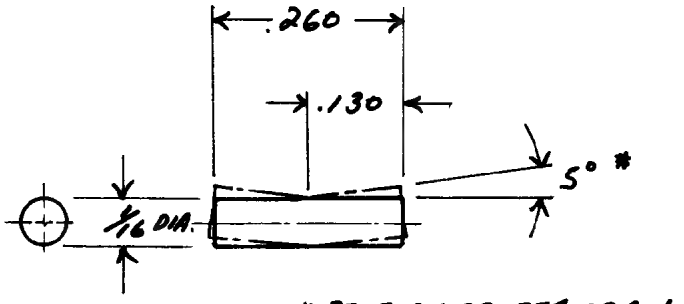
Scale: 2X

SEAR AND TRIGGER PIN
(2 REQUIRED)



Scale: 4X

SEAR RIVET (4 REQUIRED)

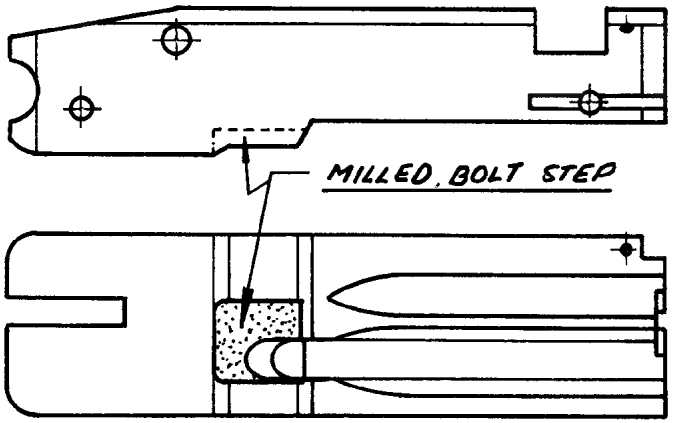


* BEND ON CENTER OF PIN.

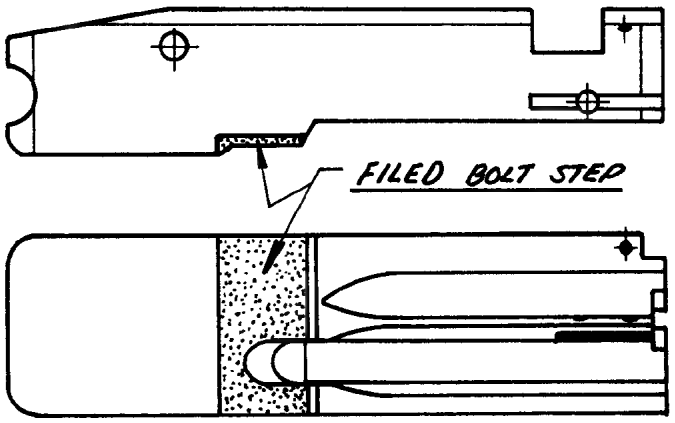
Scale: 4X

SEAR\TRIGGER SPRING GUIDE RETAINING PIN

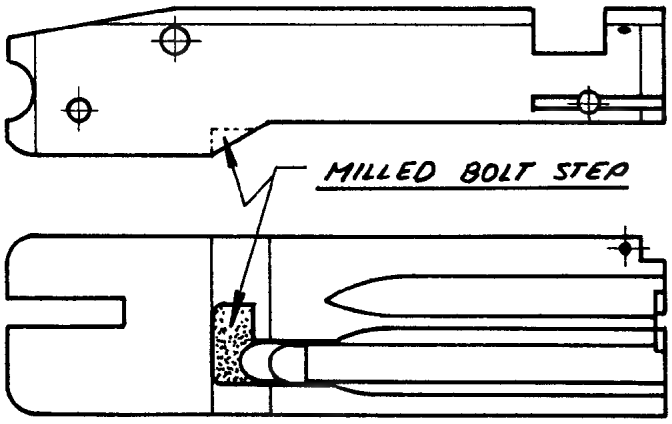
FOR PIVOTING HAMMER

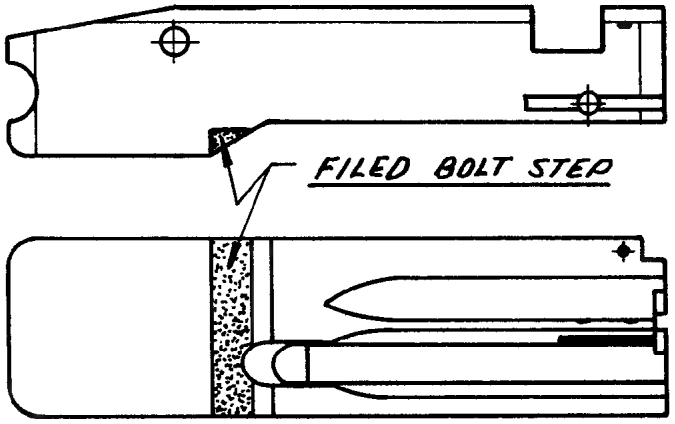


FOR FIXED FIRING PIN



BOLT-OLD TYPE

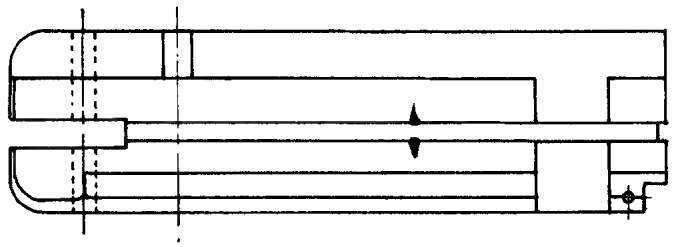


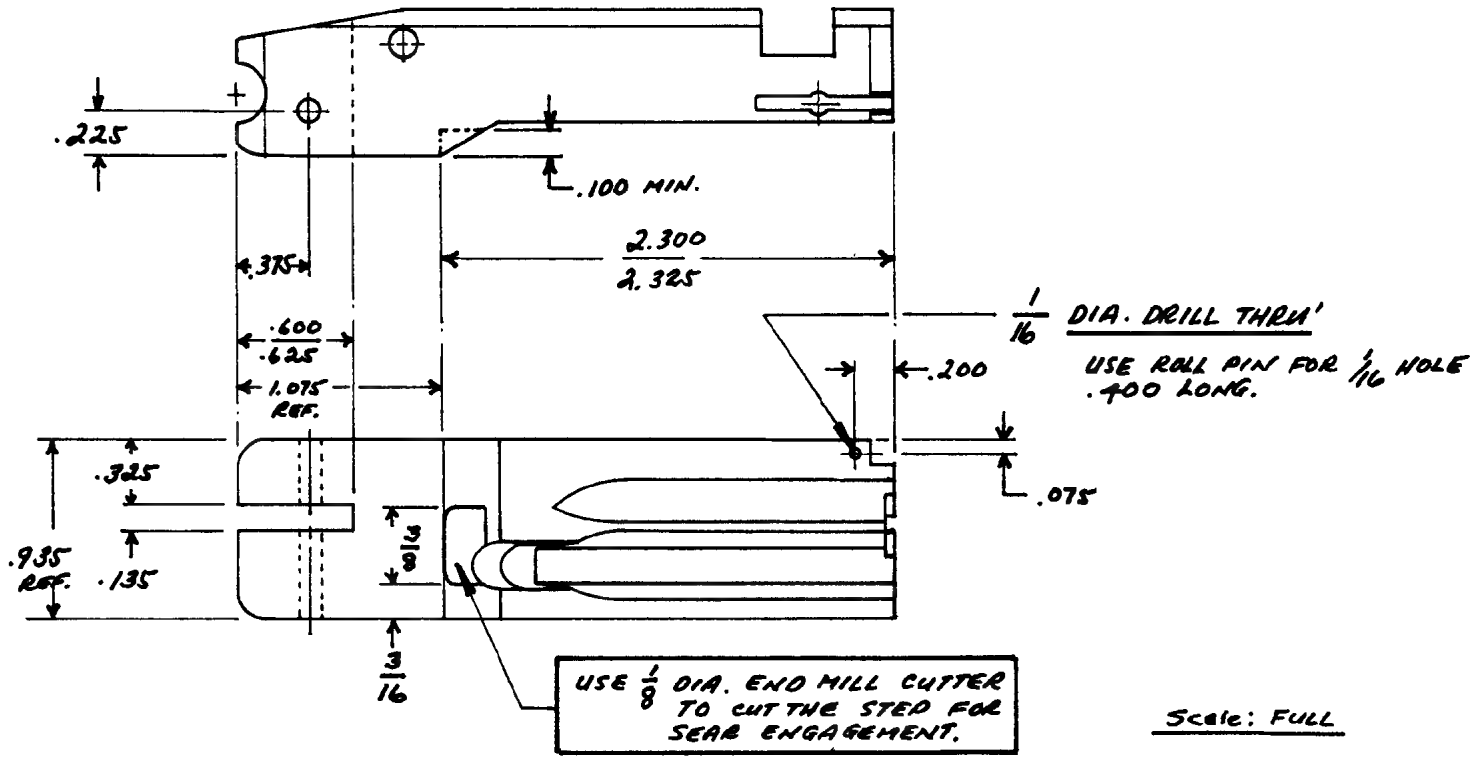


BOLT-NEW TYPE

SCALE: FULL

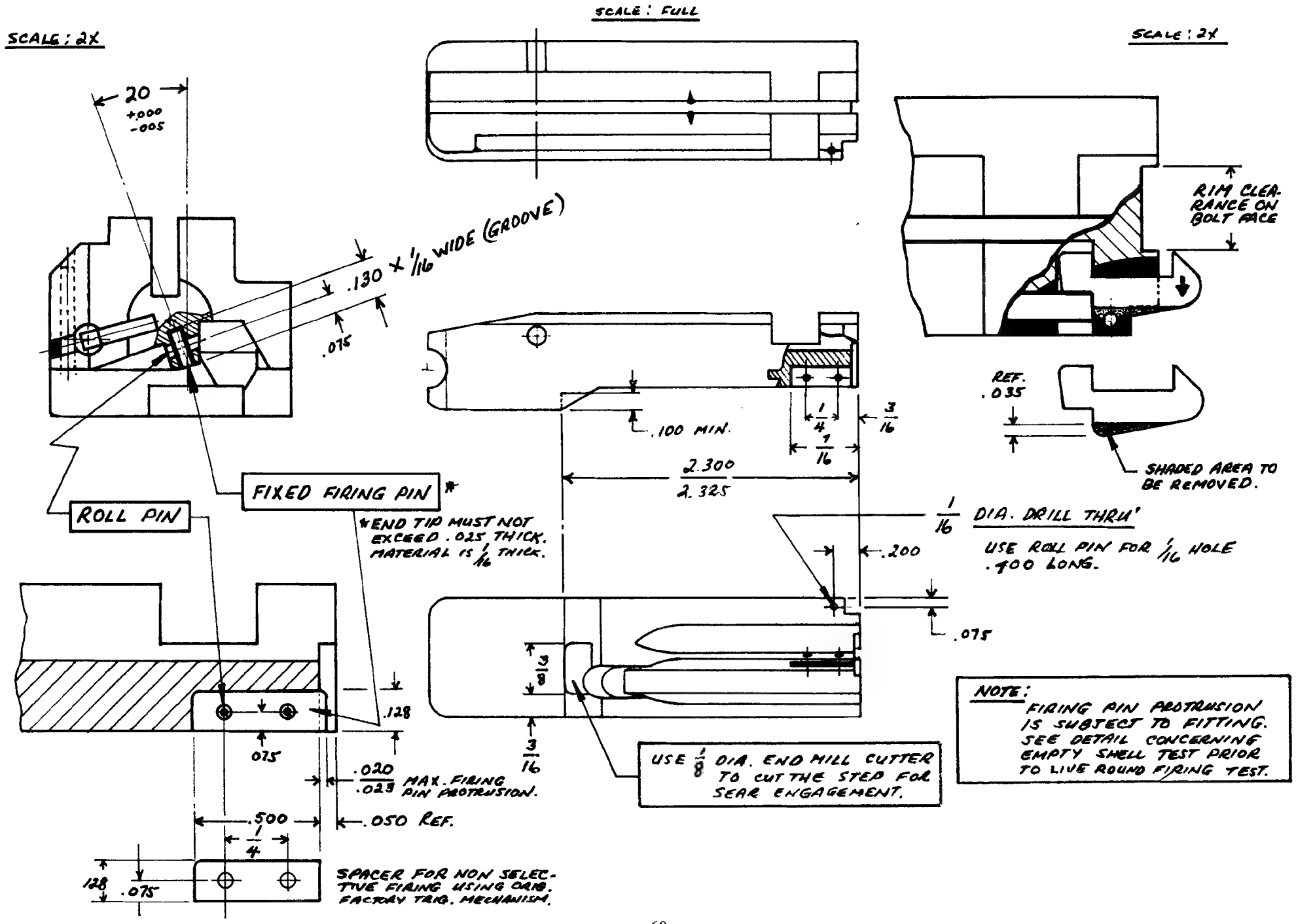
BOLT MODIFICATION FOR PIVOTING HAMMER

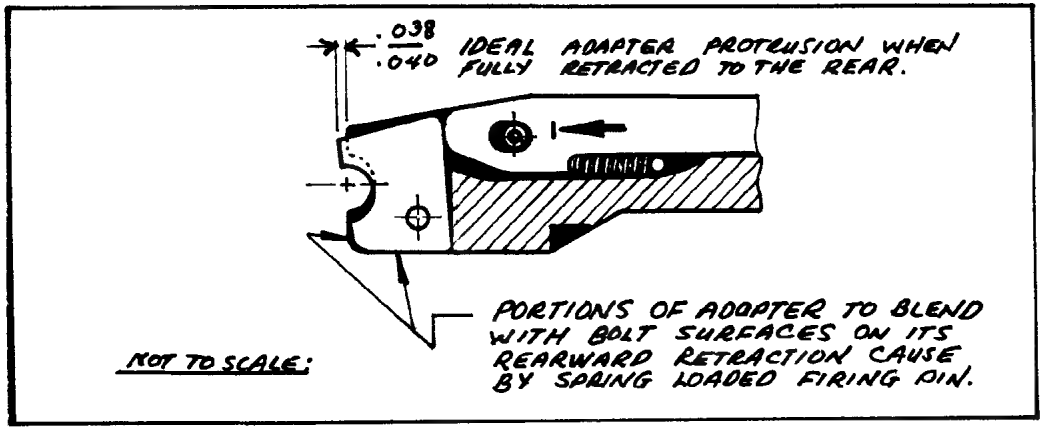


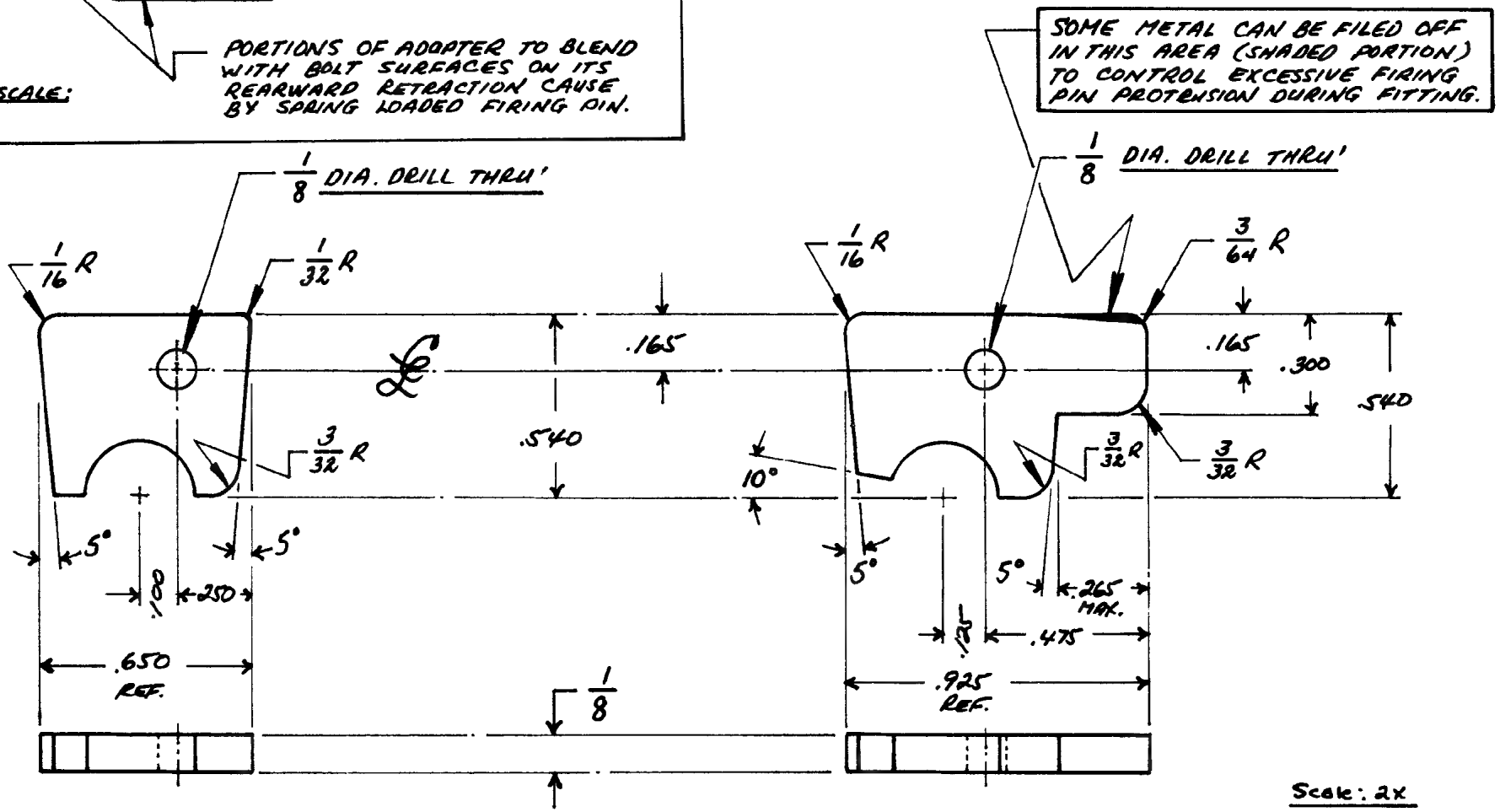


Scale: FULL

BOLT MODIFICATION FOR FIXED FIRING PIN



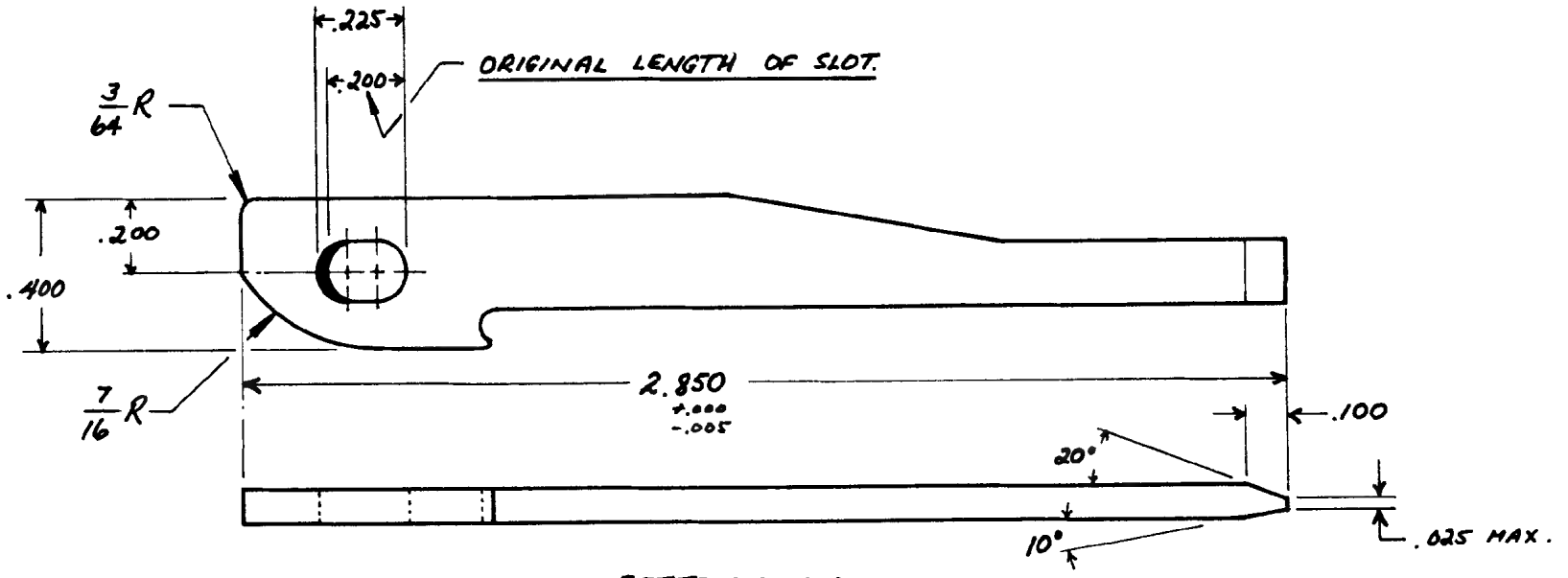




FIRING PIN ADAPTER

HAMMER

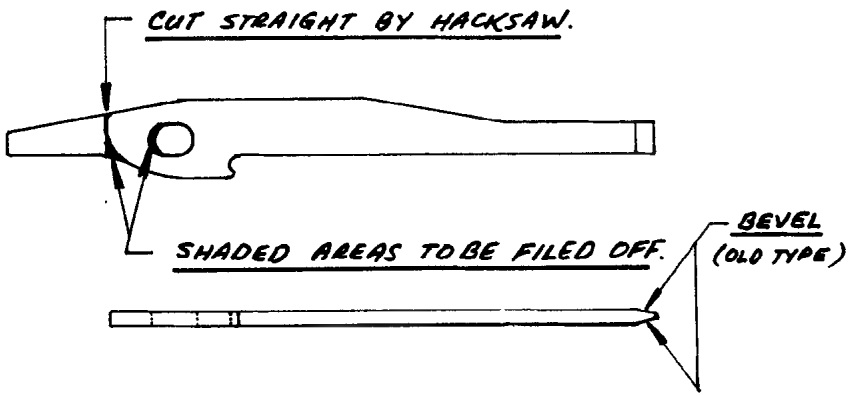
DETAIL - FIRING PIN MODIFICATION



BOTTOM VIEW

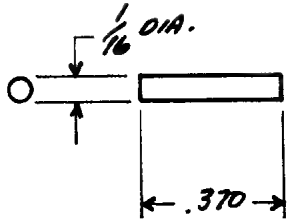
NOTE: EXCEPT AS NOTED, PART REMAINS THE SAME.

Scale: 2X



FULL SCALE TEMPLATE

TRIP PIN



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9. Test Firing Preparations

Before conducting the actual test firing of the newly converted rifle, the following precautions must be fully observed and corrected as needed.

Prepare about ten empty shells. With the weapon fully assembled, draw the cocking handle to the rear. *Make sure that the chamber is empty.* The bolt will be held in open position to the rear by the sear. Insert an *empty* magazine—the one you will use for live fire testing—without altering the position of the empty shell inserted in the chamber. Press the trigger; the bolt will move forward and chamber the round.

Leave the bolt in its closed position. Remove the magazine slowly then look under the magazine well to see if the bolt has fully closed after loading the empty shell into the chamber. If there is a gap between the chamber and bolt face, the cartridge would have fired while only partially chambered. This is dangerous and must be corrected before live firing. (See causes and remedies.) If you have an untapered firing pin tip, bevel it to reduce the end blade diameter to .025 inch so it can sink deeper into the cartridge rim during bolt closure. This will improve the firing and reduce the possibility of misfire. Repeat the same empty shell test until the bolt closure is correct. Make sure the indentation on the rim of the empty shell is deep enough to detonate the cartridge. Gradually remove excess metal from the lower part of the hammer to reduce firing pin protrusion.

During actual test firing, the rifle must be slightly canted to the right with the ejection port facing slightly downward. This is an extra precaution for the operator in case of a ruptured cartridge case or blown-off extractor. Wear adequate eye protection. Observe all safety precautions during testing of the weapon.

10. Critical Points of Function

CAUSE OF MALFUNCTION	REMEDY
PREMATURE IGNITION—Caused by excessive firing pin protrusion and incomplete closure of the bolt during ignition. This problem may also cause the extractor, which is not pinned to the bolt, to be blown off if a cartridge head is ruptured. A slight gap between the bolt and chamber face during firing could cause this. *CAUTION: A blown-off extractor is a very dangerous malfunction that may cause serious injury to the shooter. For this reason, it is highly recommended that the extractor be pinned in place or a 1/16-inch diameter hole be drilled on the right side of the extractor to prevent it from disengaging from its seat. (See photo and drawings for instructions.) A roll pin for a 1/16-inch hole is then press fitted into the drilled hole to lock the extractor in place. Note that the extractor must move slightly to the right to clear the rim of the shell during ejection. Therefore the location of the stop pin must be calculated with the extractor partially retracted to the right until its hook clears the counterbore of the bolt face securing the cartridge rim.*	Gradually remove some of the metal on the lower part of the hammer that makes contact with the ignition shoulder (ejector pin) until correct firing pin protrusion is achieved. Also check the hammer assembly notch at the back of the bolt to make certain that the hammer's forward movement is not restricted when hitting the ignition shoulder. If the full forward movement of the hammer stops before the bolt is fully closed, the notch must be cut further to the front so that the hammer can pivot further forward to close the bolt properly. The firing pin protrusion must not exceed .030 inch with the bolt fully closed and the lower part of the hammer resting against the ignition shoulder. The firing pin protrusion can easily be seen through the magazine well with the rifle fully assembled.

CAUSE OF MALFUNCTION	REMEDY
FAILURE TO FIRE—Weak recoil spring or too short firing	Replace recoil spring with stronger one. The older models of

pin protrusion. The lower part of the hammer is not reaching the ignition shoulder during bolt closure.

1022 recoil spring have more coils and the springs are slightly stronger than the current production recoil springs. The older-type recoil springs work well. If you have the newer model, you can make your recoil spring stronger by adding more coils—as many as 15 to 18 more coils as long as the bolt can be reassembled to the receiver. The more coils you can add, the better the rifle will work, particularly when high-velocity ammunition is used. To add more coils to your standard recoil spring, prepare two small washers of the same outside diameter as the recoil spring bushing that is normally inserted at the end of the recoil spring rod after spring assembly. The thickness of the washers must not exceed .025 inch and their center holes must be loose but not excessively so when the recoil spring rod is inserted through them. One washer is to be installed between the joints of the springs so they will not tangle when they are compressed. The remaining washer will replace the standard recoil spring bushing before the cocking handle is installed on the recoil spring rod. If the firing pin protrusion is too short, check to see if the lower part of the hammer is reaching the ignition shoulder. To do this, remove the magazine catch assembly and look through the large opening inside the magazine catch assembly hole. Make sure that the rifle is fully assembled so that you can see if the ignition timing is set properly. Take a small pointed rod 1/8-inch diameter, insert it into the large magazine catch hole, and try to push the lower part of the hammer resting against the ignition shoulder (ejector pin). If you find that the lower part of the hammer is not resting on the ignition shoulder, the hammer or firing pin must be replaced. If you can see that the firing pin protrudes when you push the lower part of the hammer with the small rod, then the hammer must be replaced. If the hammer is pushed hard and there is no firing pin protrusion, the firing pin is too short and must be replaced with a longer one. It is always wise to leave a small allowance for final fitting on the rear end of the firing pin when cutting it. If the hammer

needs to be replaced, add more metal to its front portion so it will contact the ignition shoulder when the bolt closes.

CAUSE OF MALFUNCTION	REMEDY
FAILURE TO EJECT—Normally caused by weak ammunition such as standard and target loads. When you add extra coils to your recoil spring, only high-velocity ammunition will cycle it properly.	Check to see that the ejector is properly assembled. Also check to see whether or not the extractor has blown off due to a case rupture. To prevent the extractor from being blown off, make a replacement extractor spring plunger that is up to 1.025 inch longer than the standard factory plunger. A longer plunger offers a better locking grip than a short one. This is one design flaw on the 1022 rifle: the extractor should have been pinned to prevent it from being blown off in the case of a cartridge rupture.
CAUSE OF MALFUNCTION	REMEDY
FAILURE TO FEED—Normally caused by an inferior magazine design. Large-capacity magazines are now available through mail order.	The operator must experiment with various types of magazines until he finds the type that will work reliably on his gun.

11. Safety Features

In the original safety catch functioning of the 1022, the hammer sear is locked and blocked by the push-button-type safety. This is an excellent safety device and is far superior to those that merely block the trigger and may allow the rifle to discharge if it is dropped or jarred. To ensure safety in the selective-fire conversion, the sear is blocked and locked by the selector pin.

As mentioned earlier, the 1022 selective-fire conversion system is based on the well-proven, open-bolt design employed on most successful submachine guns. The open-bolt system allows for rapid cooling of the barrel—a definite advantage in a burst-firing weapon to prevent the "cook off" hazard often encountered in closed-breech automatic weapons. But since the bolt is held open in its "ready-to-fire" mode, it is necessary to lock the bolt positively during intervals between firing to prevent accidental discharge if the gun is dropped or jarred. The safety feature incorporated in the selective-fire conversion is that the sear is blocked and locked by the safety/selector pin when the selector lever is on "safe" whether the bolt is in "closed" or in "open, ready-to-fire" position. *Do not carry the weapon in the cocked position when it is not in use.* Carry it with a loaded magazine in place but in a closed-bolt position with the safety engaged. The selector must always be on "safe" if the weapon is not being fired. In carrying the weapon through brush, the cocking handle may accidentally be caught by a tree branch. If this happens, the cocking handle may be drawn to the rear and, since it is not caught by the sear, the bolt may strip a cartridge from the magazine, and the weapon will fire accidentally. If your selector is on "safe," the bolt will not move since it is locked in place by the sear nose. The bolt can also be held open and locked by the safety lever pin during normal cleaning. This eliminates the need for a hold-open device.

To ensure maximum safety in handling the selective-fire conversion, thoroughly familiarize yourself with the new operating procedures of the weapon. Explain the new operating principle to anyone who handles the gun to avoid regrettable consequences. Always be sure of what you are doing. This is the best safety measure that you can provide for yourself and your shooting companions.

RELOCATING SELECTOR INDEXES ON SELECTOR PIN

The selector pin and its lever must be permanently assembled, shaped to their final configurations, and polished before the selector indexes are located and drilled. Once this is done, follow these steps for precisely locating the selector pin indexes:

1. Assemble the slave pin with the index plunger assembly in place. Apply metal ink around the selector pin and let it dry.

If metal ink is not available, use a permanent black felt marker.

2. Once the ink is dry, insert the selector pin into the right side of the safety hole in the trigger housing. (The selector can be inserted on the left side for lefthanded shooters.) The gun must be fully assembled when inserting the selector pin for index calculation.

3. Rotate the selector lever all the way to the rear until it rests against the stock edge, then rotate it all the way forward until it rests against the stock. Rotate it completely forward and back several times. The spring loaded index plunger will make a semi-circular line on the selector pin.

4. After about twenty rotations, move the selector lever to the middle vertical downward position, and slowly pull the selector pin out of the safety hole about 3/16 inch. With the slave pin, completely push the selector lever pin from the hole. The index plunger should make a straight line mark on the selector pin when it is driven out.

5. Check the selector pin. Using a center punch, make an indentation at both ends of the semi-circular line made by the index plunger. Then find the straight line that was scribed by the index plunger when the selector pin was withdrawn from the safety hole (step 4). Once you find this line, mark it with the center punch where it meets the semi-circular line. When you are marking these index locations, do not make deep indentations. Even shallow marks will allow you to feel when the index plunger engages as the indentations align with it.

6. Smooth the burred area of the index holes with a small needle file so that the pin can be inserted freely into the safety hole.

7. Insert the selector back into the safety hole, pushing out the slave pin. Now rotate the selector lever from index to index. You will feel that even with the shallow marks made with the center punch, the selector index plunger will engage as the shallow holes align with it.

8. Rotate the selector slowly and feel the index stops. Make sure that the three stops will properly position the selector. If a hole does not properly line up, reink the pin and repeat the marking procedure.

9. The marked holes can now be drilled with a 1/16-inch diameter drill bit. Drill them 1/16-inch deep. Countersink the top edges of the holes with a 5/64-inch diameter drill.

10. After this procedure is complete, remove the rifle body from the stock and separate the receiver group from the trigger housing group.

11. Assemble the new selector to the completely assembled trigger group, pushing out the slave pin.

12. Move the selector lever to the full-forward position (in this case to "semiauto"). This position is a more advisable arrangement as you will not need to replace the original index plunger assembly. Press the trigger hard so that the lower part of the sear will make a mark on the selector pin parallel to it.

13. Remove the selector lever and pin by pushing it out with the slave pin after rotating it about 30 degrees so it will disengage from its index for easy removal.

14. File the selector pin where the lower part of the sear made an impression with a small, square needle file. Any flat file from 1/16-inch to 5/64-inch in thickness can be used to cut the selector notch. Remove only a small amount of metal

at a time and reinsert the selector. Press the trigger and the sear will move down. Note that when the trigger is pressed, the sear nose which protrudes above the trigger housing frame must align with the top of the frame in order to release the bolt forward to fire the gun.

15. If the sear nose does not align with the top of the trigger housing frame, remove more material from the selector notch until the sear nose aligns properly. Be careful that you do not remove excessive metal in this area during this process or you may prevent the disconnector system from operating properly. Make sure that there is at least one-eighth the distance remaining from the back of the trigger to the inside arc of the trigger guard when you feel the trigger pull hesitation caused by the lower part of the sear resting against the shallow notch of the pin. This remaining distance will allow for the disconnection of the trigger hook and the trip step before the full pull of the trigger is reached. This is your key to positive semiauto functioning.

16. If the one-eighth allowance has been reached for the trigger pull and the sear nose still protrudes enough to prevent bolt release, file it down until it is flush with the top of the trigger housing frame. Make sure, however, that you have at least 3/32 of an inch minimum contact surface between the bolt and sear nose for safe engagement.

17. After you have completed fitting for semiauto functioning, the full auto notch will be cut. Set the selector to full auto and press the trigger hard as in step 12. Reink the metal if the coloring has worn off.

18. Remove the selector by pushing it out with the slave pin and perform the same procedure as described for semiauto functioning. This time the notch must be deep enough that the sear's lower part will not make any contact with the selector pin notch to prevent the disconnection of the trigger hook and trip. This will result in full auto operation.

NOTES ON OLDER MODEL 1022 BOLT DESIGN CONFIGURATION

The old Ruger 1022 bolt design has dual steps underneath the bolt. The sear nose specification described here is for the newer model 1022 bolt. When using the old-style bolt for selective-fire conversion, the sear nose must be moved further to the rear. This is necessary because of the second shallower step on the rear of the inclined portion of the bolt. This shallower step can be used for sear engagement by simply deepening it to about 5/64 of an inch maximum depth.

When calculating the distance for sear nose engagement, make sure that the bolt is parallel to the front surface of the trigger housing frame when it is cocked. Always make sure that there is at least 3/16 of an inch minimum allowance for bolt recoil past the sear for positive reengagement of sear and bolt during operation.

THE DETACHABLE RIGHT-SIDE-MOUNTED RECOIL SPRING AND ITS FUNCTION

To achieve the most reliable performance of the 1022 selective-fire conversion, an additional recoil spring must be fitted to the original offset left-side-mounted factory recoil spring. This will provide more forward thrust as well as positive bolt closure to prevent rupture of the shell rim caused by poor headspace. The headspace problem occurs on impact of the bolt face during forward recoil against the breech end of the barrel. The front face of the bolt tends to shift to the right of the receiver assisted by the offset left-side-mounted recoil spring assembly. This shifting of the bolt to the right is caused primarily by the gap inside the receiver body where the bolt travels. During the impact of the bolt face on the breech end, the shifting of the bolt face will open a slight gap on the right side between the bolt face and

chamber.

In the original hammer-fired semiautomatic firing mode, the bolt stops before the hammer strikes the firing pin no matter how fast the trigger is pulled. Furthermore, in the fired position, the hammer's spring tension, as well as that of the bolt's recoil spring, will resist the rearward recoil of the bolt, causing a slight delay in the bolt's opening. This delay prevents shell rupture caused by an unsupported shell rim.

In an open bolt system, whether fixed firing pin or pivoting hammer design, the same counter pressure against the fired shell must occur to ensure safe and reliable operation of the weapon. In this design, each time the bolt closes, the weapon fires. The bolt does not momentarily stop before a shot is fired as on a hammer-fired design. Therefore, it is necessary to incorporate a dual spring arrangement to: first, counter the tendency of the bolt to shift to the right to prevent the headspace problem caused by an unnecessary gap; and second, ensure positive primer ignition each time the bolt closes through the more powerful forward thrust of a dual recoil spring unit.

The addition of the detachable right-side-mounted recoil spring unit is the solution to the headspace problem. The added spring unit stabilizes any bolt shifting during the operating cycle. The dual spring unit also gives greater support for the bolt against the rearward pressure of the fired shell and delays the opening of the bolt sufficiently to prevent shell rupture.

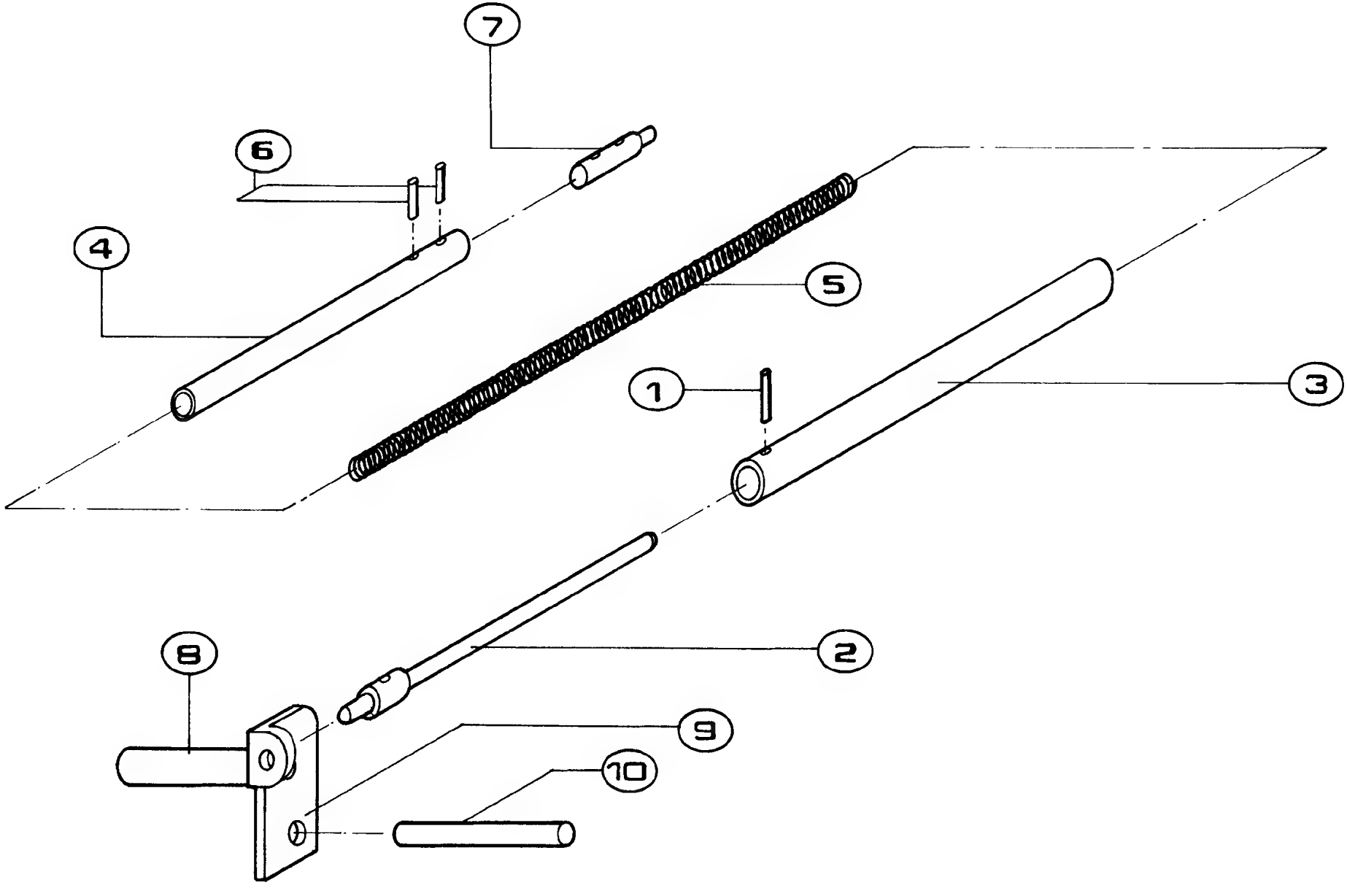
The dual recoil spring arrangement also increases the forward thrust of the bolt by 100 percent. This increased forward bolt thrust ensures positive primer ignition and reduces the felt recoil by 100 percent. With the incorporation of this system, muzzle rise is completely eliminated and the gun can be fired very comfortably on full automatic with one hand. The cyclic rate of fire, however, is also increased by about 50 percent with the added recoil spring. Use only a high-capacity magazine, especially when firing full automatic.

Note:

Before building the right-side-mounted, detachable recoil spring unit, you must first order a spare recoil spring unit from the factory. The unit costs just over three dollars and consists of a recoil spring, recoil spring rod, bushing, and cocking handle.

To disassemble the spring unit as it comes from the factory, either hammer the peened part that retains the spring assembly or grind it until it is level with the diameter of the spring guide rod itself. Either of these two procedures will free the spring unit from the rod. Before either grinding or hammering, retract the cocking handle in the middle of the rod as far as it will go and wrap an elastic band around the rod in front of the cocking handle to prevent it from moving forward so it will not interfere with your work. Release the spring carefully after the peened part of the rod is level so as not to lose the cocking handle and the small bushing in front of the spring. Keep the recoil spring rod, cocking handle, and bushing for future use and use the spare recoil spring to build the right-side-mounted recoil spring unit.

Assembly - Side mounted Recoil Spring Unit.



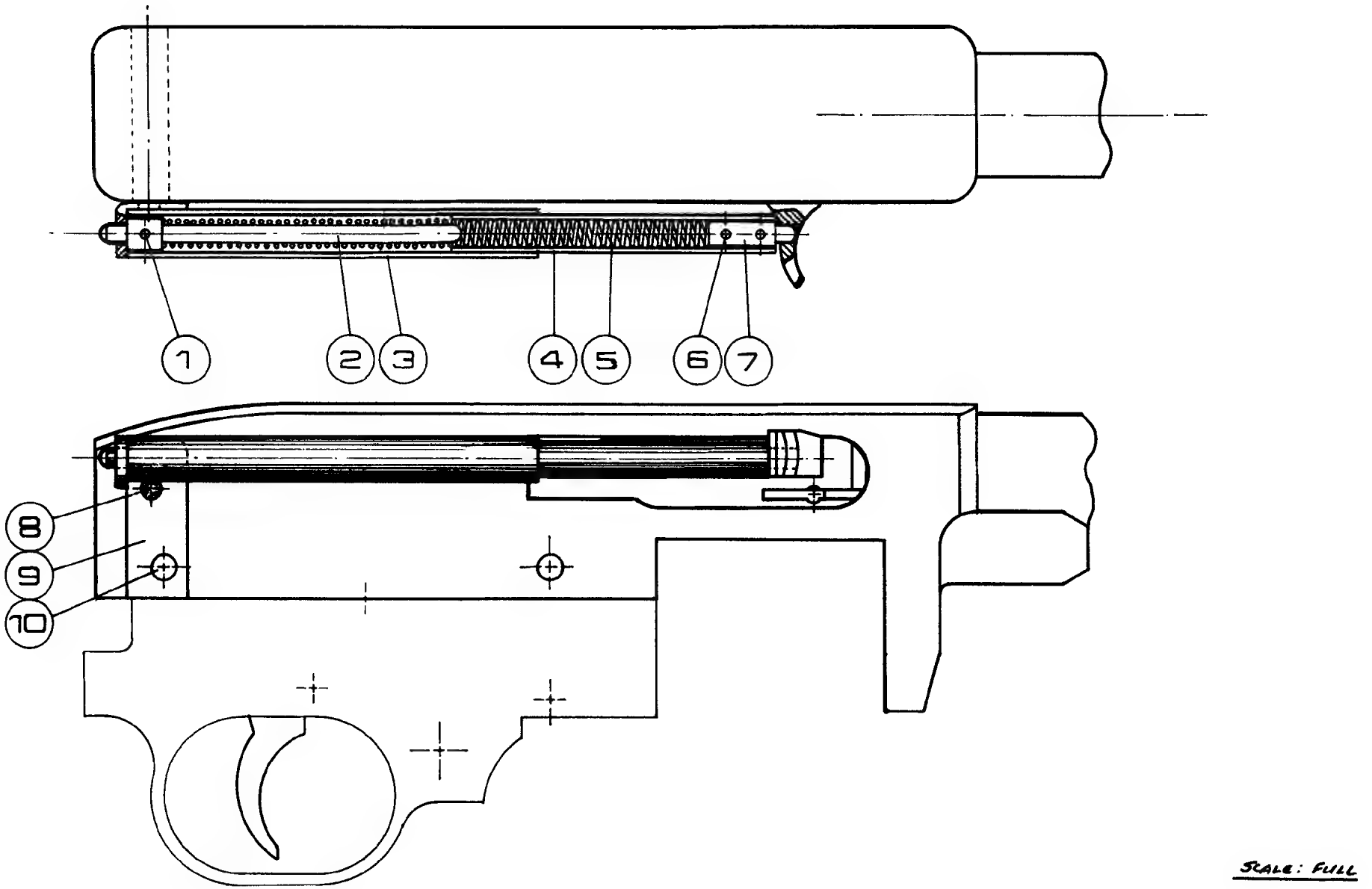
PARTS NOMENCLATURE AND SPECIFICATIONS FOR THE DETACHABLE RIGHT-SIDE-MOUNTED RECOIL SPRING UNIT

1. RECOIL SPRING ROD RIVET—1/16-inch diameter x 5/16-inch-long mild steel rod. A roll pin for a 1/16-inch hole is usable if available.
2. RECOIL SPRING ROD—1/8-inch diameter drill rod (see specifications).
3. RECOIL SPRING UNIT OUTER TUBING—car radio antenna with an inside diameter not less than .263 inch but not more than .266 inch is usable. The tubing thickness must not exceed .030–.035 inch. The overall length of the tubing is 2.850 inches maximum.
4. RECOIL SPRING UNIT INNER TUBING—car radio antenna is also usable for this one. If the inside diameter of your outer tubing is .266 (17/64) inch maximum, the outside diameter of your inner tubing should be between .258–.261 inch. The inside diameter of your inner tubing must be not less than .200 inch so that the original 1022 spring with an outside diameter of .188 will have enough clearance to operate properly inside the tubing. The thickness of the inner tubing should be approximately .035 inch. The overall length of the inner tubing is 2.250 inches.
5. RECOIL SPRING—standard production Ruger 1022 recoil spring (order from the factory). The recoil spring is sold as a unit complete with cocking handle and recoil spring guide and sells for just over three dollars.
6. INNER TUBING END PLUG RIVETS—1/16 inch x .260 inch long. A roll pin for a 1/16-inch diameter hole is also usable (two required).
7. INNER TUBING END PLUG—3/16-inch diameter drill rod. Mild steel is also usable.
8. SUBSTITUTE BOLT STOP PIN—1/4-inch diameter x 1.330 inch long (see specifications). This pin is about 1/16 inch longer than the standard bolt stop pin. The excess length is reduced to 9/64 inch diameter and will be riveted to the formed sheet metal spring unit base.
9. SPRING UNIT BASE—1/16-inch-thick sheet metal (see specifications). Mild steel is usable.
10. SUBSTITUTE REAR RECEIVER CROSS PIN—3/16 inch diameter x 1.330 inch long. This pin is about 1/16 inch longer than the standard original pin. The excess length will be inserted in the lower hole of the sheet metal spring base to prevent it from moving during assembly of the complete spring group.

NOTE:
Part of the stock where the spring base will seat will need to be inletted so that the receiver body can be inserted freely inside the stock cutout. The clearance is about .475 inch wide and will be level with the lower portion of the receiver. The gap required is about 1/16 inch maximum.

If the detachable recoil spring unit is not used for nonselective firing, the spring base can be left as is and will not interfere with the operation of the weapon as long as the spring unit is removed. This only applies if you are using the original hammer-fired mechanism for nonselective-firing with nonhigh-velocity ammunition (standard or target loads). The dual spring system used with the selective-fire mechanism can also be used with the factory trigger components for nonselective-firing when high velocity rounds are used such as CCI Stingers, Winchester Expediters and Remington Yellow Jackets. The dual spring unit improves the head space closure since the offset left-side-mounted factory recoil spring arrangement is now countered by the right-side-mounted detachable recoil spring. The loading process is also improved; due to the increased recoil spring tension, the gun works perfectly even when the receiver is subjected to excessive powder fouling during rapid fire.

In case you do not want to leave the spring base attached to the receiver, a 1/16-inch thick metal or plastic spacer whose top part is blended with the stock contour is easily installed and can be painted to match the wood furniture.



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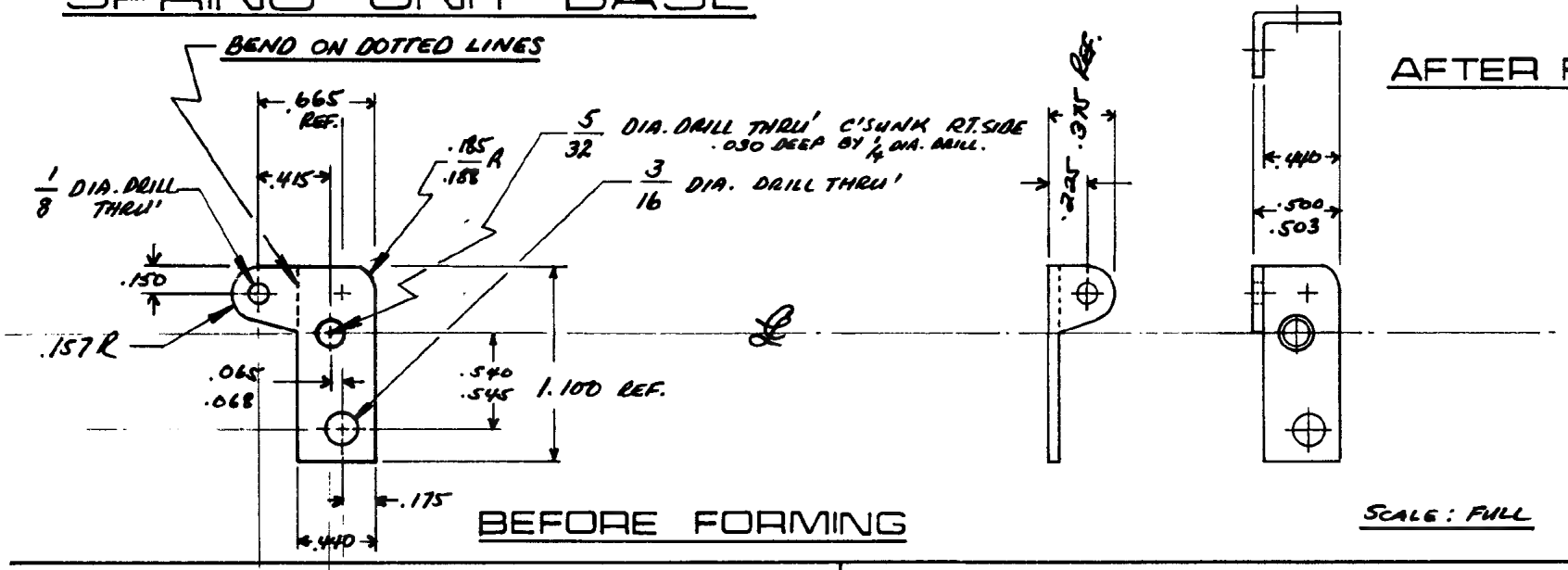
DETACHABLE SIDE MOUNTED SPRING UNIT (FOR SELECTIVE FIRE USE ONLY).

SPRING UNIT BASE



BEFORE FORMING

AFTER FORMING

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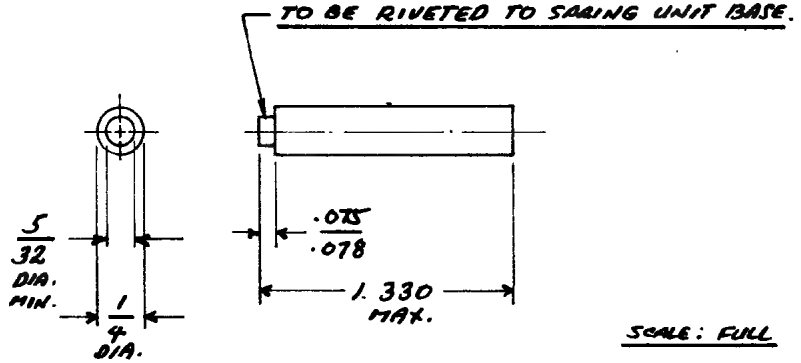
SUBSTITUTE BOLT STOP PIN



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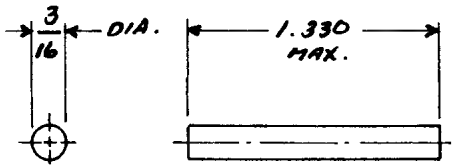
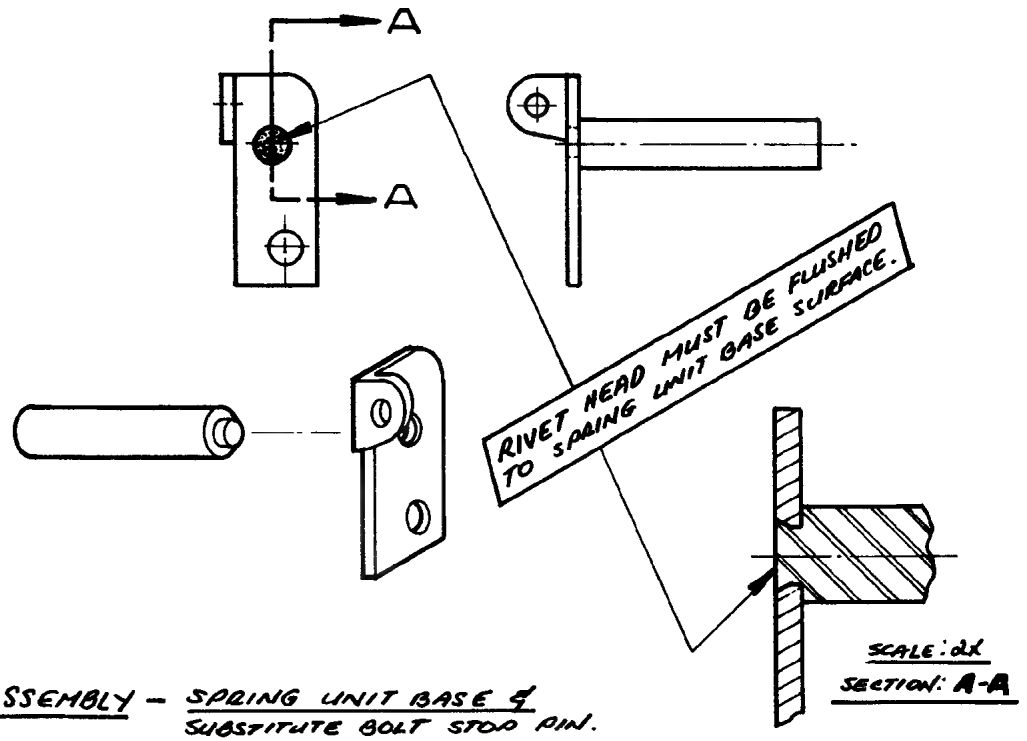
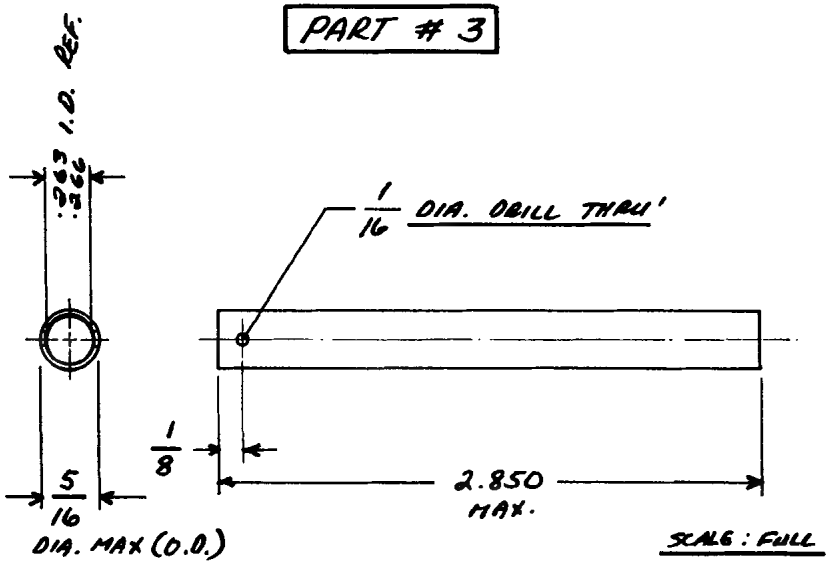
SUBSTITUTE REAR RECEIVER CROSSPIN.





ASSEMBLY – SPRING UNIT BASE & SUBSTITUTE BOLT STOP PIN.

PART # 3



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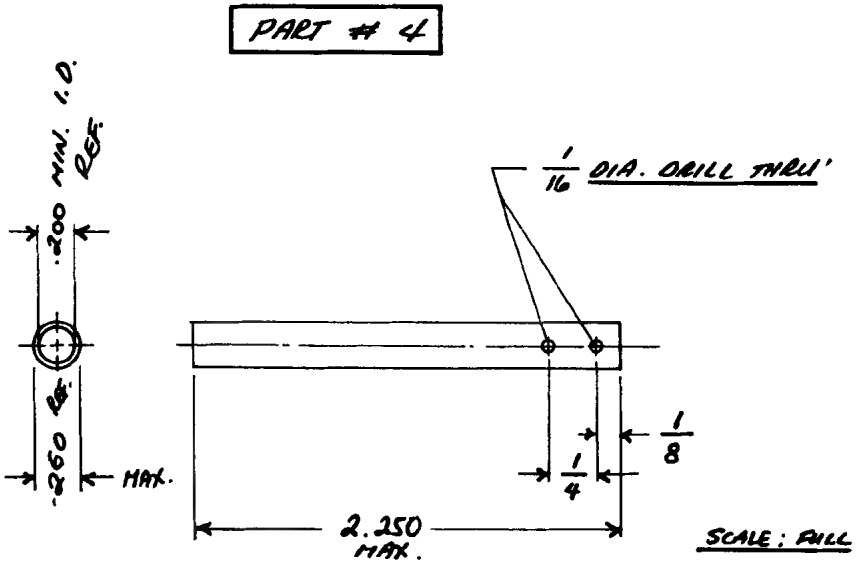

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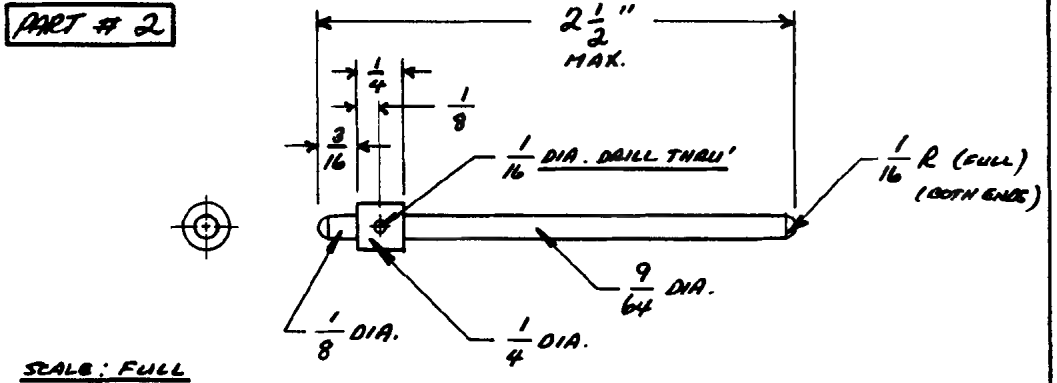

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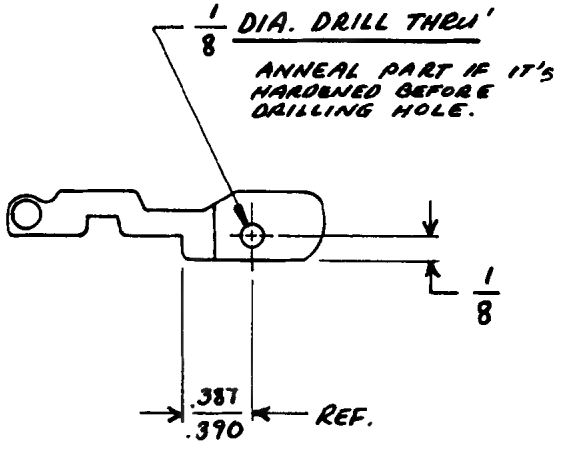
COCKING HANDLE MODIF.



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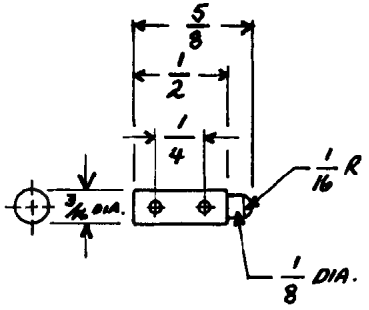
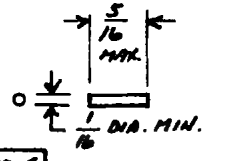
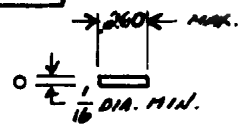


PART # 7



PART # 1

PART # 6



NOTE: COCKING HANDLE MUST BE DISASSEMBLED FROM SPRING UNIT BEFORE ANNEALING & DRILLING.

INSTALLING THE RIGHT-SIDE-MOUNTED RECOIL SPRING UNIT ON THE GUN

1. Assemble the rifle in the normal order with the substitution of the following parts: the original bolt stop pin is replaced by the new one with the spring base riveted onto it. The lower hole of the base must be in line with the rear connecting hole of the trigger housing plate and receiver body.

2. Assemble the trigger mechanism assembly to the receiver assembly in the usual order, inserting the substitute longer pin through the spring base hole first then into the receiver body, connecting the trigger housing plate unit in the usual manner. Assemble the other pin in the front next.

3. Insert the rifle body into the stock in the normal order. Make sure before inserting the rifle body into the stock that the slave pin is first inserted into the safety hole in the trigger housing frame so that the rifle body can be inserted freely before installation of the selector.

4. Make sure that you have also inletted a clearance for the right-side-mounted recoil spring unit on the right side of the stock before assembly so the rifle body will seat properly in the stock.

5. Tighten screws that secure rifle body to stock and push out the slave pin with the selector pin as you install it.

6. Assemble recoil spring inside the outer tubing, first installing the spring onto its internal guide rod. Now install the inner tubing on the other end of the spring and compress both pieces of tubing so the spring will be secured inside of them.

7. With the rifle resting on your lap with its right side facing up, and your hands holding and restraining both the inner and outer tubing, first insert the lower end of the outer tubing (reduced diameter plunger) into the spring base hole (bent part). After the outer tubing's end plunger is inserted, the other end of the inner tubing plunger is inserted into the drilled hole in the cocking handle. The spring unit is now fully assembled and ready for action.

NOTE:
For normal assembly and disassembly, only the inner and outer tubing are retracted to remove the spring assembly, leaving the spring base in place on the receiver frame. Removal of the spring assembly in this manner will take only seconds and it can be reassembled quickly if the need arises.

SIMPLIFIED ALTERNATIVE ARRANGEMENT

A. MODEL 2 SEAR

The model 2 sear is virtually the same in function and basic configuration as the model 1 described here except in its trip arrangement design. In the model 1 the tripper operates by a pivoting action to disengage and reengage during trigger pull in semiautomatic firing. The model 1 arrangement also requires a heavy-duty tripper spring for positive engagement with the trigger hook.

The model 2 sear accomplishes disengagement and reengagement during semiauto firing by the forward and rearward motion of the trip each time disconnection of the trip and trigger occurs when the trigger is pulled. The trip in this arrangement requires a very light spring instead of a heavy one. The firing pin return spring of the 1022 is usable for this purpose, or a spring of similar size can be adapted. The model 2 sear works as well as the model 1 and does not require as much fitting or adjustment.

Fire selection for semi- and full auto will be the reverse on the model 2. While the model 1 uses a deep notch on the selector pin for full auto firing, the model 2 uses the shallow notch. Furthermore, the sear step will be much shorter for positive disengagement during semiauto firing. In the shallow notch, the trigger pull is controlled and the disengagement process is avoided, giving full automatic firing.

B. FIXED FIRING PIN SYSTEM

For the benefit of those who do not want to incorporate the pivoting-hammer design described here, a simple but fully reliable fixed firing pin design system is included. This arrangement, however, will require a small groove 1/16 inch wide and about 1/2 inch long to be cut under the bolt feed rail itself. The original firing pin is positioned on the top of the bolt and is spring loaded so it will not interfere with the loading process. A fixed firing pin mounted on top of the bolt or in the original firing pin location will prevent the cartridge from lining up with the chamber hole during loading, as the rim of the cartridge will be blocked from lining up with the chamber hole by the protruding tip of the firing pin on the bolt face.

In order to avoid this problem, it is necessary to position the fixed firing pin where it will not interfere with loading. The pin is therefore located on the feed rail itself. This portion of the bolt strips the top cartridge from the magazine during loading. Positioning the firing pin in front of the feed rail on the face of the bolt will ensure positive feeding. This system was employed in the American 180 submachine gun and the now out-of-production Gevarm semiautomatic .22 caliber rifles made in France in the early sixties.

The fixed firing pin is held in place in the small groove of the bolt feed rail by two small roll pins which can easily be punched out should a replacement firing pin be required. Here again, it is of primary importance to make sure that the bolt fully closes during primer ignition. The empty shell test is highly advisable here before firing the weapon with live rounds. The firing pin protrusion should not exceed .025–.030 inch and the firing pin tip must be bevelled to .025 inch to ensure a deep indentation on the shell and assist positive bolt closure. The step underneath the bolt for sear engagement as well as the stop pin for the extractor must also be included in this bolt modification in order to function reliably and safely with the trigger mechanism.

Whichever design you employ will require the heavier recoil spring for reliable operation of the weapon. Although high-velocity ammunition is recommended, it is best to use standard velocity ammunition during testing, especially if you are using the factory recoil spring with additional coils. A heavier replacement recoil spring is specified in this book and a good gunsmith should be able to manufacture one for you. The power of the replacement spring should be almost twice that of the factory recoil spring so that high-velocity ammunition may be used safely. The mild recoil spring not only produces misfires as the bolt's forward thrust is con-

siderably slowed down during loading, but also does not have enough power to effect the delay in bolt opening when firing high-velocity ammunition until the pressure drops to a safe limit, resulting in a ruptured cartridge rim or shell.

CAUTION:
Do not use high-velocity ammunition until you have incorporated a stronger recoil spring into your gun. Load only two or three rounds during testing and gradually add more as testing progresses. Always use eye and hearing protection during shooting. Be a safe shooter.

NOTES ON MODEL 2 SEAR MATERIALS AND CONSTRUCTION SPECIFICATIONS

Material specifications in the manufacture of the model 2 sear are the same as the model 1. The model 2 is also of three-piece construction and is riveted into one piece. Functioning is identical except for the trip action. The model 1 sear uses a pivoting action while the model 2 sear's trip moves forward and rearward under spring tension to engage and disengage with the trigger hook.

The model 1 sear's pivot pin is located under the ejector pin. The model 2 uses the ejector pin as its own pivot for more positive disengagement action during semiauto firing. Both sears can be used alternately on the same converter housing since the external configuration and size is the same except for pivot location. The same safety selector mechanism is usable, giving a reversed selective-fire arrangement. The model 1 has a "safe," "full auto" (middle position) and "semiauto" (full forward position) arrangement derived from the AK-47 assault rifle selector arrangement; the safety lever rests against the underside of the stock to prevent further rotation of the lever for positive semiauto functioning. On the model 2 sear, the action setting is the reverse, as is employed on most major selective fire weapons. This is the "safe," "semiauto," (middle position) and "full auto" (full forward) index.

While the shallow notch on the selector lever pin produces semiauto fire with the model 1 sear, it does the reverse with the model 2 sear due to the difference in disengagement action of the different trip arrangements. The same reverse action also applies in full auto firing.

Apart from these differences, the operational systems are identical and either of the bolt modification arrangements (pivoting hammer or fixed firing pin design) will work on both converter mechanisms. The pivoting hammer or fixed firing pin bolt group arrangement can also be used interchangeably with either of the converter mechanisms.

12. Parts and Accessories Dealers

The following is a partial list of independent manufacturers and dealers currently marketing parts and accessories for the Ruger 1022 rifle that you may find useful for your individual weapons requirements. It is best to contact these firms and request the current product catalog and price listings. You can also order these parts and accessories through your gun dealer.

COMPANY	ACCESSORIES
FEATHER ENTERPRISES 2500 Central Avenue Boulder, CO 80301 Tel. (303) 442-7021	Falcon Foldup folding stock Flash hider Ventilated steel handguard Replacement military sight system (HK type) 50, 30 and 25 round magazines Adjustable barrel band complete with swivel Quick detachable padded assault sling Nylon or steel detachable bipods
QUARTERMASTER SALES 7201 Avenida La Costa N.E. Albuquerque, NM 87109	Black Warrior FN type folding stock made of fiberglass filled plastic
JENKINS ENTERPRISES P.O. Box 124 St. George, UT 84770	Bullpup configuration stock
PARELLEX CORPORATION Box F Chicago Ridge, IL 60415	Paratrooper (German MP 40 type) folding stock
MITCHELL ARMS INC. 114 South Geneva St. Ithaca, NY 14850	50 round high-impact plastic magazine with see-thru back plate

Many of the Ruger 1022 accessories such as the extended magazines, sights, handguard, flash hider, sling and swivels, and folding stock were provided by Feather Enterprises. For their catalog send $1.00 to:

Feather Enterprises
Dept. PP
2500 Central Avenue
Boulder, CO 80301

Feather Enterprises deals only in firearms accessories. They do not manufacture or alter firearms to fire in fully automatic mode.

Warning

It is against the law to manufacture a firearm without an appropriate license from the federal government. There are also state and local laws prohibiting the possession of such weapons in many areas. Severe penalties are prescribed for violations of these laws. Be warned!

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